FORM PTO-1390 US DEPARTMENT OF COMMERCE REV. 5-93PATENT AND TRADEMARK OFFICE **TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371**		ATTORNEYS DOCKET NUMBER **P01,0041** U.S. APPLICATION NO. (if known, see 37 CFR 1.5) **09/786388**
INTERNATIONAL APPLICATION NO. **PCT/DE99/02753**	INTERNATIONAL FILING DATE **01 SEPTEMBER 1999**	PRIORITY DATE CLAIMED **02 SEPTEMBER 1998**

TITLE OF INVENTION

METHOD FOR DETERMINING A GRAPHIC STRUCTURE OF A TECHNICAL SYSTEM AND ARRANGEMENT AND SET OF ARRANGEMENTS FOR DETERMINING A GRAPHIC STRUCTURE

APPLICANT(S) FOR DO/EO/US

ERWIN THURNER

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay.
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.

5. ☒ A copy of International Application as filed (35 U.S.C. 371(c)(2)) - drawings attached.
   a. ☒ is transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☐ has been transmitted by the International Bureau.
   c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US)
6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2) - drawings attached.

7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. §371(c)(3))
   a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☐ have been transmitted by the International Bureau.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☒ have not been made and will not be made.

8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).

9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).

10. ☒ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 16. below concern other document(s) or information included:

11. ☒ An Information Disclosure Statement under 37 C.F.R. 1.97 and 1.98; **(PTO 1449, Prior Art, Search Report, 04 References).**

12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 C.F.R. 3.28 and 3.31 is included.
    (SEE ATTACHED ENVELOPE)

13. ☒ Amendment "A" Prior to Action and Appendix "A".
    ☐ A SECOND or SUBSEQUENT preliminary amendment.

14. ☒ A substitute specification and substitute specification mark-up.

15. ☐ A change of address letter attached to the Declaration.

16. ☒ Other items or information:
    a. ☒ Submission of Drawings

    b. ☒ EXPRESS MAIL #EL655301165US dated March 2, 2001

U.S. APPLICATION NO (if known, see 37 C.F.R. 1.5) 09/786388	INTERNATIONAL APPLICATION NO PCT/DE99/02753	ATTORNEY'S DOCKET NUMBER P01,0041

17. ☒ The following fees are submitted:	CALCULATIONS	PTO USE ONLY
BASIC NATIONAL FEE (37 C.F.R. 1.492(a)(1)-(5): Search Report has been prepared by the EPO or JPO $860.00 International preliminary examination fee paid to USPTO (37 C.F.R. 1.482) $690.00 No international preliminary examination fee paid to USPTO (37 C.F.R. 1.482) but international search fee paid to USPTO (37 C.F.R. 1.445(a)(2) $710.00 Neither international preliminary examination fee (37 C.F.R. 1.482) nor international search fee (37 C.F.R. 1.445(a)(2) paid to USPTO $1000.00 International preliminary examination fee paid to USPTO (37 C.F.R. 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4) $ 100.00		
ENTER APPROPRIATE BASIC FEE AMOUNT =	$ 860.00	
Surcharge of $130.00 for furnishing the oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 C.F.R. 1.492(e)).	$	

Claims	Number Filed		Number Extra	Rate		
Total Claims	14	- 20 =	0	X $ 18.00	$	
Independent Claims	02	- 3 =	0	X $ 80.00	$	
Multiple Dependent Claims				$270.00 +	$	
TOTAL OF ABOVE CALCULATIONS =					$ 860.00	
Reduction by ½ for filing by small entity, if applicable. Verified Small Entity statement must also be filed. (Note 37 C.F.R. 1.9, 1.27, 1.28)					$	
SUBTOTAL =					$ 860.00	
Processing fee of $130.00 for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492(f)). +					$	
TOTAL NATIONAL FEE =					$ 860.00	
Fee for recording the enclosed assignment (37 C.F.R. 1.21(h). The assignment must be accompanied by an appropriate cover sheet (37 C.F.R. 3.28, 3.31). $40.00 per property +						
TOTAL FEES ENCLOSED =					$ 860.00	
					Amount to be refunded	$
					charged	$

a. ☒ A check in the amount of $860.00 to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account No. _____ in the amount of $_____ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 50-1519. **A duplicate copy of this sheet is enclosed.**

NOTE: Where an appropriate time limit under 37 C.F.R. 1.494 or 1.495 has not been met, a petition to revive (37 C.F.R. 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

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BOX PCT
IN THE UNITED STATES DESIGNATED/ELECTED OFFICE
OF THE UNITED STATES PATENT AND TRADEMARK OFFICE
UNDER THE PATENT COOPERATION TREATY--CHAPTER II

PRELIMINARY AMENDMENT A
PRIOR TO ACTION

APPLICANT(S):	ERWIN THURNER
ATTORNEY DOCKET NO.:	P01,0041
INTERNATIONAL APPLICATION NO:	PCT/DE99/02753
INTERNATIONAL FILING DATE:	01 SEPTEMBER 1999
INVENTION:	METHOD FOR DETERMINING A GRAPHIC STRUCTURE OF A TECHNICAL SYSTEM AND ARRANGEMENT AND SET OF ARRANGEMENTS FOR DETERMINING A GRAPHIC STRUCTURE

Assistant Commissioner for Patents,
Washington D.C. 20231

Sir:

Applicants herewith amend the above-referenced PCT application, and request entry of the Amendment prior to examination on the United States Examination Phase.

IN THE SPECIFICATION

Please cancel the code listings on pages 15-32—they are replicated in their entirety in the Appendix of the Substitute Specification.

IN THE CLAIMS:

On substitute page 33:

replace line 1 with --WHAT IS CLAIMED IS:--;

Please replace original claims 1-14 with the following rewritten claims 1-14, referring to the mark-ups in Appendix A.

1. (Amended) A method for determining a graphic structure of a technical system, comprising the steps of:

a) selecting a graphic structure file from a set of a plurality of different graphic structure files, each graphic structure file containing indications of which elements can be selected to represent it in order to describe the structure of the technical system graphically;

b) selecting said elements in said graphic structure file in such a way that said technical system is described using said selected elements, and

c) representing said elements by an editor program into which said selected graph structure file has been integrated, which determines said graphic structure of said technical system.

2. (Amended) The method as claimed in claim 1, wherein said technical system is an electronic circuit.

3. (Amended) The method as claimed in claim 2, wherein said technical system is a piece of technical equipment.

4. (Amended) The method as claimed in claim 1, wherein said elements are graphic elements of a graphic which describe said technical system.

5. (Amended) The method as claimed in claim 1, further comprising the step of checking said graphic structure of said technical system for predefined structure rules.

6. (Amended) An arrangement for determining a graphic structure of a technical system, comprising:

a) a memory in which a set of a plurality of different graphic structure files are stored, each said graphic structure file comprising indications of which elements can be selected to represent it in order to form a graphic;

b) a selector unit with which a graphic structure file can be selected from

said set of graph structure files;

c) a processor configured to execute an editor program, said editor program being used to determine a graphic with elements of said selected graphic structure file via which a graphic structure is determined; and

d) a representation component which is coupled to said editor program and with which a specific graph structure can be represented.

7. (Amended) The arrangement as claimed in claim 6, wherein a structure of a technical system is described using the graph.

8. (Amended) The arrangement as claimed in claim 7, wherein said technical system is an electronic circuit.

9. (Amended) The arrangement as claimed in claim 7, wherein said technical system is a piece of technical equipment.

10. (Amended) The arrangement as claimed in claim 6, further comprising:

a) a first subarrangement which comprises said memory; and

b) a second subarrangement which is coupled to said first subarrangement and comprises:

said selector unit;

said editor program; and

said representation component.

11. (Amended) The arrangement as claimed in claim 10, wherein said first subarrangement and said second subarrangement are coupled to one another via a communications network.

12. (Amended) The arrangements as claimed in claim 10, wherein said structure of a technical system is described using a graphic.

13. (Amended) The arrangement as claimed in claim 12, wherein said technical system is an electronic circuit.

14. (Amended) The arrangement as claimed in claim 12, wherein said technical system is a piece of technical equipment.

REMARKS

The present Amendment revises the specification and claims to conform to United States patent practice, before examination of the present PCT application in the United States National Examination Phase. Pursuant to 37 CFR 1.125 (b), applicants have concurrently submitted a substitute specification, excluding the claims, and provided a marked-up copy. All of the changes are editorial and applicant believes no new matter is added thereby. The amendment, addition, and/or cancellation of claims is not intended to be a surrender of any of the subject matter of those claims.

Early examination on the merits is respectfully requested.

Submitted by,

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Appendix A
Mark Ups for Claim Amendments

This redlined draft, generated by CompareRite (TM) - The Instant Redliner, shows the differences between -
original document : Q:\DOCUMENTS\YEAR 2001\P010041-THURNER-DETERMINING A GRAPHIC STRUCTURE\ORIGINAL CLAIMS.DOC
and revised document: Q:\DOCUMENTS\YEAR 2001\P010041-THURNER-DETERMINING A GRAPHIC STRUCTURE\AMENDED CLAIMS.DOC

CompareRite found 87 change(s) in the text

Deletions appear as Overstrike text surrounded by []
Additions appear as Bold-Underline text

1. **(Amended)** A method for determining a graphic structure of a technical system, **comprising the steps of:**

a) **selecting a graphic** ~~[a) in which a graph]~~ structure file ~~[is selected]~~ from a set of a plurality of different ~~[graph]~~ **graphic** structure files, ~~[a graph]~~ **each graphic** structure file containing ~~[in each case]~~ indications of which elements can be selected to represent it in order to describe the structure of the technical system graphically~~[.]~~;

b) ~~[in which]~~ **selecting said** elements ~~[are selected]~~ **in said graphic structure file** in such a way that ~~[the]~~ **said** technical system is described using ~~[the]~~ **said** selected elements, and

c) ~~[in which the]~~ **representing said** elements ~~[are represented]~~ by an editor program into which ~~[the]~~ **said** selected graph structure file has been integrated, ~~[by]~~ which ~~[means the]~~ **determines said** graphic structure of ~~[the]~~ **said** technical system ~~[is determined.]~~.

2. **(Amended)** The method as claimed in claim 1, ~~[in which the]~~ **wherein said** technical system is an electronic circuit.

3. **(Amended)** The method as claimed in claim 2, ~~[in which the]~~ **wherein said** technical system is a piece of technical equipment.

4. **(Amended)** The method as claimed in ~~[one of claims 1 to 3, in which the]~~ **claim 1, wherein said** elements are ~~[graph]~~ **graphic** elements of a ~~[graph]~~ **graphic** which describe ~~[the]~~ **said** technical system.

5. **(Amended)** The method as claimed in ~~[one of claims 1 to 4, in which the]~~**claim 1, further comprising the step of checking said** graphic structure of ~~[the]~~ **said** technical system ~~[which is determined is checked]~~ for predefined structure rules.

6. **(Amended)** An arrangement for determining a ~~[graph]~~ **graphic** structure of a technical system, **comprising:**

a) ~~[having]~~ a memory in which a set of a plurality of different ~~[graph]~~ **graphic** structure files are stored, ~~[a graph]~~ **each said graphic** structure file ~~[containing in each case]~~ **comprising** indications of which elements can be selected to represent it in order to form a ~~[graph,]~~ **graphic;**

b) ~~[having]~~ a selector unit with which a ~~[graph]~~ **graphic** structure file can be selected from ~~[the]~~ **said** set of graph structure files~~[,]~~**;**

c) ~~[having]~~ a processor ~~[which is]~~ configured ~~[in such a way that]~~ **to execute** an editor program ~~[can be executed, with which]~~**, said** editor program ~~[a graph structure file selected from the set of graph structure files can be]~~ **being** used to determine a ~~[graph]~~ **graphic** with elements of ~~[the]~~ **said** selected ~~[graph]~~ **graphic** structure file~~[, by]~~ **via** which ~~[means the graph]~~ **a graphic** structure is determined**; and**~~[,]~~

d) ~~[having]~~ a representation component which is coupled to ~~[the]~~ **said** editor program and with which ~~[the]~~ **a** specific graph structure can be represented.

7. **(Amended)** The arrangement as claimed in claim 6, ~~[in which]~~ **wherein** a

structure of a technical system is described using the graph.

8. **(Amended)** The arrangement as claimed in claim 7, ~~[in which the]~~ **wherein said** technical system is an electronic circuit.

9. **(Amended)** The arrangement as claimed in claim 7, ~~[in which the]~~ **wherein said** technical system is a piece of technical equipment.

10. **(Amended)** The arrangement as claimed in claim 6, **further comprising:**

a) ~~[a) having]~~ a first subarrangement which ~~[has the]~~ **comprises said** memory**; and**~~[,]~~

b) ~~[having]~~ a second subarrangement which is coupled to ~~[the]~~ **said** first subarrangement and ~~[has the following components:]~~ **comprises:**

~~[- the]~~ **said** selector unit~~[,]~~**;**

~~[- the]~~ **said** editor program**; and**~~[,]~~

~~[- the]~~ **said** representation component.

11. **(Amended)** The arrangement as claimed in claim 10, ~~[in which the]~~ **wherein said** first subarrangement and ~~[the]~~ **said** second subarrangement are coupled to one another ~~[by means of]~~ **via** a communications network.

12. **(Amended)** The ~~[set of]~~ arrangements as claimed in claim 10 ~~[or 11, in which a]~~**, wherein said** structure of a technical system is described using ~~[the graph.]~~ **a graphic.**

13. **(Amended)** The arrangement as claimed in claim 12, ~~[in which the]~~ **wherein said** technical system is an electronic circuit.

14. **(Amended)** The arrangement as claimed in claim 12, ~~[in which the]~~ **wherein said** technical system is a piece of technical equipment.

SPECIFICATION

TITLE

METHOD FOR DETERMINING A GRAPHIC STRUCTURE OF A TECHNICAL SYSTEM AND ARRANGEMENT AND SET OF ARRANGEMENTS FOR DETERMINING A GRAPHIC STRUCTURE

BACKGROUND OF THE INVENTION

Field of the Invention

1 The invention relates to the selection of elements of a graph structure file in order to describe the structure of a techical system graphically.

Description of the Related Art

2 It is known to describe different technical systems by means of a graphic structure. Such descriptions are known from, for example, product brochures for products provided by Zuken-Redac (e.g., Analysis Products, CAD Products, CAE Products, CAM Products, and Data Conversion Products—formerly available on September 22, 1998 at http://www.redac.co.uk/prod_info/brochures/14a.html) (the Zuken-Redac brochures), herein incorporated by reference, that disclose how, for a technical system such as an electronic circuit, the electrical circuit is determined in the form of a graphic structure with elements which describe an electronic circuit.

3 Elements of a graphic structure in the field of a circuit simulation are symbols which symbolize electronic components, for example, a resistor, a capacitor, an inductor, a transistor, an operational amplifier or other electronic components composed of these elements.

4 In the method and arrangement known from the Zuken-Redac brochures, elements for graphically describing an electronic circuit which are made available to a user by an editor program are selected in such a way that the "electronic circuit" constituting the technical system is described using the selected elements. The elements are represented by the editor program.

5 A graphic structure describes a graphic G (= V, E, Ψ) which has a finite, non-empty set V ($v \in V$ designate nodes of the graphic G), and a finite set E ($e \in E$

designate edges of the graphic G). The nodes and edges of the graphic are logically combined by an incidence function Ψ which is formed according to the following rule:

$$\Psi: E \rightarrow \{\{i, j\} \mid i, j \in V\} \qquad (1)$$

6 Each edge e of the set E of edges is assigned its two end places by the incidence function $\Psi(e)$.

7 Depending on the field of application, different types of nodes and edges may be provided in an editor program for describing a technical system. Nodes and edges to which an application-dependent semantic is assigned are generally designated as elements of the graphic in an editor program. A node element of a graphic is, for example in the editor program in the Zuken-Redac brochures, a symbol which symbolizes an electronic component of the electronic circuit. The edges can be used to describe weighted connections between the individual elements. Generally, the respective nodes and edges can be assigned a weight, a value or any desired text for information (textual information).

8 G. Chiola, G. Franceschinis, R. Gaeta and M. Ribaudo, GreatSPN 1.7: Graphical Editor and Analyzer for Timed and Stochastic Petri Nets, Performance Evaluation, special issue on Performance Modeling Tools, 24 (1&2), pp. 47 - 68, November 1995 (Chiola), herein incorporated by reference, discloses an editor program for determining a Petri net. A Petri net is preferably used to analyze and design a closed-loop control system or an open-loop control system of a technical system, generally for describing system characteristics of a technical system. A graphic, which is illustrated in the form of a Petri net, has a place S or a transition T as elements. A general overview of a Petri net and its basic elements can be found in G. Schmidt, Grundlagen der Regelungstechnik: Analyse und Entwurf linearer und einfacher nichtlinearer Regelungen sowie diskreter Steuerungen [Principles of control technology: analysis and design of linear and simple nonlinear closed-loop controls and discrete open-loop controls], second edition, Springer-Verlag [Publishing House], ISBN 3-540-17112-6, Berlin, pp. 320 - 328, 1991 (Schmidt), herein incorporated by reference.

9 A Petri net is generally a triplet

$$N := < S, T, F >$$

where

(i) $S = \{ s1 , s2 , ... , sn \}$	Set of places
(ii) $T = \{ t1 , t2 , ... , tm \}$	Set of transitions
(iii) $S \cap T = \varnothing$	S and T disjunctive (the node set is composed of S and T)
(iv) $F \subseteq (SxT) \cup (TxS)$	Flow relation

10 A particular disadvantage with the known methods and arrangements is the fact that in each case elements of a graphic which are provided only for a specific application are made available as a function of the application in order to determine the graphic structure of a technical system. Thus, with the editor program from the Zuken-Redac brochures, only a selection of the elements can be made to describe an electronic circuit, and in the case of the editor program from Chiola, only a selection of elements can be made to describe a Petri net.

11 Such a known editor program is thus extremely inflexible in a situation in which a user wishes to use different types of a graphic structure to describe a technical system. In this type of program, it is necessary to develop for each specific application a separate editor program which is adapted to the application, something which entails considerable development costs.

SUMMARY OF THE INVENTION

12 The invention is therefore based on providing a method for determining a graphic structure of a technical system, and an arrangement and a set of a plurality of arrangements for determining a graphic structure which has improved flexibility in comparison with the known methods and arrangements.

13 The problem is solved by a method for determining a graphic structure of a technical system (which may be an electronic circuit or a piece of technical equipment) has the following steps:

14 a) a graphic structure file is selected from a set of a plurality of different graphic structure files, a graphic structure file containing, in each case, indications of

which elements can be selected to represent the graphic structure file in order to describe the structure of the technical system graphically,

b) elements are selected in such a way that a technical system is described using the selected elements, and

c) the elements are represented by an editor program into which the selected graphic structure file has been integrated, via which the graphic structure of the technical system is determined.

The problem is also solved by an arrangement for determining a graphic structure has the following features:

a) a memory in which a set of a plurality of different graphic structure files are stored, a graphic structure file containing, in each case, indications of which elements can be selected to represent it in order to form a graphic,

b) a selector unit with which a graphic structure file can be selected from the set of graphic structure files,

c) a processor configured to execute an editor program, with which editor program a graphic structure file selected from the set of graphic structure files can be used to determine a graphic with elements of the selected graphic structure file, by which means the graphic structure is determined, and

d) a representation component which is coupled to the editor program and with which the specific graphic structure can be represented.

In the inventive method, the elements may be graphic elements of a graphic which desribes the technical system. Also, a further step of checing the graphic structure of the technical system for predefined structure rules may be provided as well.

A set of a plurality of arrangements for determining a graphic structure has:

a) a first arrangement which has a memory in which a set of a plurality of different graphic structure files are stored, a graphic structure file containing in each case indications of which elements can be selected to represent it in order to form a graphic, and

b) a second arrangement which is coupled to the first arrangement and has the following components:

26 - a selector unit with which a graphic structure file can be selected from the set of graphic structure files,

27 - an editor program with which a graphic structure file selected from the set of graphic structure files can be used to determine a graphic with elements, of the selected graphic structure file, via which the graphic structure is determined, and

28 - a representation component which is coupled to the editor program and with which the specific graphic structure can be represented.

29 The invention discloses a method which is very flexible in comparison with the known methods and arrangements, and a very flexible arrangement for determining a graphic structure which can be adapted to new application scenarios in a quick and easy way and can be adapted more satisfactorily to existing application scenarios.

30 In this way, different types of structures which can be represented as a graphic can be processed flexibly, cost-effectively, and easily with the inventive method or arrangement.

31 These inventive aspects are described in more detail below.

32 The technical system is preferably an electronic circuit or a piece of technical equipment. The elements are preferably graphic elements of a graphic which describe the technical system.

33 In a further refinement there is provision for the graphic structure of the technical system which is determined to be checked for predefined structure rules. In this way, it is possible to check a structure of the technical system determined by a user for predefined structure rules, which ensures that the structure rules for the respective technical system are complied within terms of its graphic structure.

34 An exemplary structure rule could be, for example, in a Petri net, the fact that a place must always follow a transition, and vice versa. If this is not the case, within the scope of this development, the disclosure is made during checking of the graphic structure of a Petri net that the corresponding structure rule is infringed.

BRIEF DESCRIPTION OF THE DRAWINGS

35 An exemplary embodiment of the invention is illustrated in the figures and explained in more detail below.

36 Figure 1 is a schematic diagram showing an arrangement according to a first exemplary embodiment;

37 Figure 2 is a pictorial diagram of a representation component with a graphic structure with elements of a Petri net;

38 Figure 3 is a pictorial diagram of a representation component with a graphic structure with elements which describe an electronic circuit;

39 Figure 4 is a flowchart in which the method steps of the method according to an exemplary embodiment are represented; and

40 Figure 5 is a block diagram of a set of a plurality of arrangements which, according to a second exemplary embodiment, are coupled to one another via a communications network.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

41 Fig. 1 shows an arrangement 100 with a set 101 of a plurality of different graphic structure files 102, 103, 104, 105. Each graphic structure file 102, 103, 104, 105 is embodied as a file which can be linked dynamically (dynamic link library).

42 A user 106 selects a graphic structure file 102, 103, 104, 105 using a selection component 108 (keyboard and/or computer mouse) which is connected to an editor program 107.

43 The selected graphic structure file, in this exemplary embodiment a first graphic structure file 103, is dynamically integrated into the editor program 107.

44 After integration into the editor program 107, a set 111 of selectable elements 112, 113, 114, which are defined in the first graphic structure file 103 as selectable elements for determining a further described graphic is displayed to the user 106 on a screen 110 via a representation component 109 which is connected to the editor program 107. In addition, in this exemplary embodiment, according to the first graphic structure file 103, a first check program 115 and a second check program

116 are integrated into the editor program 107 and made available to the user 106 for selection.

45 Each graphic structure file 102, 103, 104, 105 has, in each case, a set of selectable elements for the respective type of graphics, in each case a graphic structure file being provided for one type of graphic. In addition, each graphic structure file 102, 103, 104, 105 may respectively contain a specific check program which is integrated into the respective graphic structure file 102, 103, 104, 105.

46 After the first graphic structure file 103 has been integrated, elements of the graphic are selected by the user 106 and connected to one another so that a graphic is determined which is stored in the form of a predefined intermediate language 117 in a memory 118.

47 In addition, Fig. 1 symbolically represents that the user 106 stores a plurality of structures 119, 120, 121, 122, 123 for describing different graphics, these structures relating to the type of graphic predefined by the first graphic file 103. The first graphic structure file 103 makes available elements which make possible a graphic in the form of a Petri net 201 (see Fig. 2).

48 Fig. 2 shows the representation component 200 which is presented to the user 106 in the form of a screen surface. The screen surface 200 has a menu list 202 with different selectable options ("File", "Edit", "Object", "View", "Tools", "Settings", "Help"). Menu items are made available to the user by means of individual selectable elements using an immediate access bar 203 by making a single, direct selection of an element.

49 In addition, a processing bar 204 is represented with selectable options for determining the graphic. Thus, in the first graphic structure file 103, a first selection element 205 is provided with which it is possible to select and process objects represented on the screen. The selection and processing of specific elements for a Petri net 201 is made available to the user 106 via a set 206 of further selector elements which will be explained in more detail below.

50 A second selector element 207 is described by an empty rectangle and symbolizes a time-specific transition. A third selector element 208 symbolizes a timeless transition, which is represented as a selected transition element 220, 221

and 222 in the Petri net 201. A fourth selector element 209 symbolizes an edge which is a directed edge in this exemplary embodiment. A fifth selector element 210 symbolizes a forbidden edge which is designated in accordance with the structure rules of a Petri net 201. A sixth selector element 211 symbolizes a place where, in each case, a place element 223, 224, 225, 226 is represented in the Petri net 201. The place elements 223, 224, 225 and 226 are connected to the transition elements 220, 221, 222 via edges 227, 228, 229, 230, 231 and 232. A seventh selector element 212 symbolizes the possibility of combining a plurality of elements of the Petri net to form a composite element. An eighth selector element 213 symbolizes an input of the Petri net 201 and a ninth selector element 214 symbolizes an output of a Petri net 201.

51 The edges and the individual nodes, i.e., the elements of the Petri net 201, are assigned textual information 251, 252, 253, 254, 255, 256, 257, 258, 259, 260 and 261. In this way it is possible to assign an additional textual description to the individual elements.

52 If a second graphic structure file 104 is integrated into the editor program 107, the second graphic structure file 104 making available elements of an electronic circuit, and thus a graphic of an electronic circuit, a screen mask represented in Fig. 3 with a set of selector elements set up for the circuit simulation is produced.

53 The same designations are used in Fig. 3 for the same elements displayed on the screen as represented in Fig. 2.

54 A set 301 of selector elements which are specifically for describing a graphic of an electronic circuit contain :

- a tenth selector element 302 which symbolizes an electronic resistor,
- an eleventh selector element 303 which symbolizes an electronic capacitor,
- a twelfth selector element 304 which symbolizes an inductor,
- a thirteenth selector element 305 symbolizing a transistor,
- a fourteenth selector element 306 symbolizing an operational amplifier,

- a fifteenth selector element 307 symbolizing a non-directed edge, and
- a sixteenth selector element 308 symbolizing a power source.

55 An electronic circuit 110 is determined by the user 106 and has, in this exemplary embodiment, a power source 311, electronic resistors 312, 313, electronic capacitors 314 and 315 and an operational amplifier 316 which are each connected to one another via edges 317. In addition, a ground terminal 318 is illustrated in Fig. 3. The individual circuit elements are assigned textual information 319, 320, 321, 322, 323, 324, 325, 326 for further explaining the electronic circuit 310.

56 Fig. 4 shows the inventive method steps. In a first step (step 401) a graphic structure file 102, 103, 104, 105 is selected from a set 101 of graphic structure files 102, 103, 104, 105. In a second step (step 402), a selection is made of elements which are available in accordance with the graphic structure file 102, 103, 104, 105 which was selected in the previous step (step 401). The selected elements are illustrated by the editor program 107 in a further step (step 403).

57 Fig. 5 shows a first computer 500 with a memory 502 and a processor 503 which are each connected to one another via a bus 504 and to an input/output interface 501. The first computer 500 is connected to a screen 505, a keyboard 506, and a computer mouse 507 via the input/output interface 501.

58 In addition, the first computer 500 is connected to further computers 510, 520, 530, 540 and 550 via a communications network 560, in the exemplary embodiment, an ISDN network (Integrated Services Digital Network).

59 The set 101 of graphic structure files 102, 103, 104, 105 is stored in the first computer 500. The further computers 510, 520, 530, 540 and 550 each also have a processor 513, 523, 533, 543 and 553 and each have a memory 512, 522, 532, 542 and 552. In each case the processor 513, 523, 533, 543 and 553 and the memory 512, 522, 532, 542 and 552 are connected to the communications network via, in each case, a bus 514, 524, 534, 544 and 554 via an input/output interface 511, 521, 531, 541 and 551. In addition, the further computers 510, 520, 530, 540 and 550 are

each connected to a screen 515, 525, 535, 545 and 555, to a keyboard 516, 526, 536, 546 and 556 and to a computer mouse 517, 527, 537, 547 and 557.

60 An editor program 508, 518, 528, 538, 548, 558 is stored in each computer 500, 510, 520, 530, 540 and 550. A graphic structure file 102, 103, 104, 105 is selected by a user of a further computer 510, 520, 530, 540 and 550, and requested from the first computer 500 with a request message 570. The first computer 500 transmits the selected graphic structure file 102, 103, 104, 105 in a reply message 580 to the further computer 510, 520, 530, 540 and 550 requesting the graphic structure file 102, 103, 104, 105.

61 The requesting further computer 510, 520, 530, 540 and 550 has thus received the requested graphic structure file 102, 103, 104, 105, and it integrates it into its editor program 518, 528, 538, 548, 558, as described in the first exemplary embodiment.

62 A number of alternatives to the exemplary embodiments described above are illustrated as follows: The type of elements which are made available by a graphic structure file is generally freely selectable and depends only on the respective type of graphic to be determined. The technical system can, for example, also be a piece of technical equipment whose characteristics or structure can be described by the graphic. The editor program and the graphic illustrated with the editor program can be used as part of a simulation of the technical system.

63 Three files are provided in the Appendix which implement the exemplary embodiments written in the C/Java programming language. These files are: 1) an initialization file, 2) a load file, and 3) a toolbar file.

64 The above-described method and arrangement are illustrative of the principles of the present invention. Numerous modifications and adaptations will be readily apparent to those skilled in this art without departing from the spirit and scope of the present invention.

ABSTRACT

65 A graphic structure file is selected from a set of a plurality of different graphic structure files. A graphic structure file contains in each case indications of which 5 elements can be selected to represent it in order to describe the structure of the technical system graphically. Elements are selected in such a way that the selected elements describe the technical system, and the elements are represented by an editor program into which the selected graphic structure file has been integrated.

APPENDIX
CODE LISTINGS

1. Initialization file:

```
package interfaces;

import java.io.*;
import java.util.*;
import java.awt.*;

import etc.*;
import elements.*;
import mmi.*;
import tools.*;

public class Initialisierung {
  GraphEditor editor;
  // Der hat die Tokens aus der
Datei
  StreamTokenizer token;
  // Hier kommen alle erlaubten
Knoten und Kanten aus der
  // .lgc Datei rein.
  // Die Eintrage werden mit den
Namen der Objekte referenziert
  Hashtable gobjekte;
  // Die aktuelle .lgc Datei
  //String configFile;
  // steht jetzt bei den Einstel-
lungen
  /**
   * Hier stehen alle Attribute
drin.
   */
  Hashtable attributNamen;
  /**
   * hier kommen die Eintrage fur
das Menue Tools
   * hinein.
   */
  Hashtable tools;

  public Initialisie-
rung(GraphEditor editor) {
    this.editor = editor;
    gobjekte = new Hashtable();
    attributNamen = new Has-
htable();
    tools = new Hashtable();
  }


  /**
   * Diese Methode würde die er-
ste Initialisierungsdatei
   * einlesen für die Einstellu-
gen der Farben, Schriften...
   * Aber ich darf leider nicht.
   */
 /*
  public void readFirst(String
name) {
    String configFile = new
String(name);
    int c;
    //Properties properties = new
Properties();
    //properties = Sy-
stem.getProperties();
    //filename = new String(".."
+ proper-
ties.getProperty("file.separator"
) + configfile);
    try {
      File file = new
File(configFile);
      //FileInputStream in = new
FileInputStream(file);
      FileReader in = new File-
Reader(file);
      token = new StreamTokeni-
zer(in);

      //Einstellen der Optionen
für token
      to-
ken.eolIsSignificant(true);
      token.quoteChar('"');
      //token.quoteChar('\'');
      //token.quoteChar('{');
      token.quoteChar('}');

      //Überlese { und , und ;
      to-
ken.whitespaceChars('{','{');
      to-
ken.whitespaceChars(',',',');
      to-
ken.whitespaceChars(';',';');


      boolean fertig = false;
        while (!fertig) {
          switch
(c=token.nextToken()){
```

```
            case StreamTokeni-
zer.TT_EOF:
                fertig= true;
                break;
               case StreamTokeni-
zer.TT_WORD:
              if
(token.sval.equals("DATAPATH")) {

c=token.nextToken();
                 if (c == '"') {
                   Sy-
stem.out.println("DATAPATH " +
token.sval);
                 }
                  break;
               }
               if
(token.sval.equals("DATAFILTER"))
{

c=token.nextToken();
                if (c == '"') {
                   Sy-
stem.out.println("DATAFILTER " +
token.sval);
                 }
                  break;
                }
                if
(token.sval.equals("FILELIST")) {
                 while (c != '}')
{

c=token.nextToken();
                     if (c ==
'"') {
                    edi-
tor.getMenueleiste().addFileToMen
u(token.sval);
                   }
                  }
                  break;
                }
                if
(token.sval.equals("COLORS")) {
                 while (c != '}')
{

c=token.nextToken();
                   if (c == Stre-
amTokenizer.TT_WORD) {
                    String aus-
wahl = token.sval;

c=token.nextToken();

//System.out.print("Wert1 " + to-
ken.nval);
                    int r =
(int)token.nval;

c=token.nextToken();

//System.out.print("Wert2 " + to-
ken.nval);
                    int g =
(int)token.nval;

c=token.nextToken();

//System.out.println("Wert3 " +
token.nval);
                    int b =
(int)token.nval;

//System.out.flush();
                    ueberge-
be(auswahl,r,g,b);
                   }
                  }
                  break;
                }
                if
(token.sval.equals("FONTS")) {
                 while (c != '}')
{

c=token.nextToken();
                   if (c == Stre-
amTokenizer.TT_WORD) {
                    String aus-
wahl = token.sval;

//System.out.print("FONT " + to-
ken.sval);

c=token.nextToken();
                    String font-
name = token.sval;

//System.out.print(" NAME " + to-
ken.sval);

c=token.nextToken();
                    String style
= token.sval;

//System.out.print(" STYLE " +
token.sval);

c=token.nextToken();
                    int size
=(int) token.nval;
                    ueberge-
be(auswahl,fontname,style,size);

//System.out.println(" SIZE " +
token.nval);
                   }
                  }
                 break;
                 }
```

```
                if
(token.sval.equals("SHORTCUTS"))
{
                  while (c != '}')
{

c=token.nextToken();
                    if (c == '"')
{
                      String
mpunkt = token.sval;

//System.out.print("MENUPUNKT " +
token.sval);

c=token.nextToken();
                      String icon1
= token.sval;

//System.out.print("ICON1 " + to-
ken.sval);

c=token.nextToken();
                      String icon2
= token.sval;

//System.out.println("ICON2 " +
token.sval);
                      edi-
tor.getShortcutleiste().addShortB
utton();
                    }
                  }
                   break;
                }
               if
(token.sval.equals("ACCELERATOR")
) {
                 while (c != '}')
{

c=token.nextToken();
                   if (c == '"') {
                     String la-
bel = token.sval;

//System.out.print("MENUPUNKT " +
token.sval);

c=token.nextToken();
                      if (c ==
StreamTokenizer.TT_WORD) {
                      char cut =
token.sval.charAt(0);

//System.out.println(" TASTEN " +
cut);
                      edi-
tor.getMenueleiste().addShortcutT
oVector(label, cut);
                      }
                  }
                  }
                  break;
                }
               if
(token.sval.equals("WINDOWSIZE"))
{

c=token.nextToken();
                     int x
=(int)token.nval;

c=token.nextToken();

c=token.nextToken();
                     int y
=(int)token.nval;

//size.setSize(x,y);
                     break;
                }
               if
(token.sval.equals("WINDOWPOSITIO
N")) {

c=token.nextToken();
                    int x
=(int)token.nval;

c=token.nextToken();

c=token.nextToken();
                     int y
=(int)token.nval;

//location.setSize(x,y);
                     break;
                }
                  if
(token.sval.equals("AUTHOR")) {

c=token.nextToken();
                   if (c == '"') {
                     Sy-
stem.out.println("AUTHOR " + to-
ken.sval);
                   }
                  break;
                }
               if
(token.sval.equals("TOOLS")) {
                   while (c != '}')
{

c=token.nextToken();
                     if (c == '"')
{
                       String pfad
=new String(token.sval);

//System.out.println("TOOL " +
token.sval);
```

```
c=token.nextToken();
                    String fi-
leName =new String(token.sval);

//System.out.println("TOOL " +
token.sval);

c=token.nextToken();
                   String text
=new String(token.sval);

//System.out.println("TOOL " +
token.sval);
                     edi-
tor.getMenueleiste().addToolToVec
tor(pfad,fileName,text);
                   }
                   }
                  break;
                } else
                  break;

              default:
            }
          }

    in.close();
    System.out.flush();
    System.out.println("EINLESEN
DER DATEI " +configFile + "
FERTIG'");

    } catch
(FileNotFoundException e) {
       System.err.println( con-
figFile + " is not found");
    } catch (IOException e) {
      e.printStackTrace();
    }
  }//read first
  */


  /**
   * Diese Methode liest eine
Toolbar ein.
   * Sie benötigt den Pfad zur
Datei und den Dateinamen.
   */
  public void readSecond(String
lgcPath, String datei) {
    String configFile = new
String(lgcPath + datei);
    int c;
    try {
      File file = new
File(configFile);
      FileReader in = new File-
Reader(file);
      token = new StreamTokeni-
zer(in);

      //Einstellen der Optionen
für token
      to-
ken.eolIsSignificant(false);
      token.quoteChar('"');
      //token.quoteChar('\'');
      //token.quoteChar('{');
      token.quoteChar('}');

      //Überlese { und , und ;
      to-
ken.whitespaceChars('{','{');
      to-
ken.whitespaceChars(',',',');
      to-
ken.whitespaceChars(';',';');



      boolean fertig = false;
        while (!fertig) {
          switch
(c=token.nextToken()){
            case StreamTokeni-
zer.TT_EOF:
              fertig= true;
              break;
            case StreamTokeni-
zer.TT_WORD:
             if
(token.sval.equals("TOOLBAR")) {
               Sy-
stem.out.println("Lese Toolbar");
               readTool-
bar(lgcPath);
               break;
             }
             if
(token.sval.equals("MENU")) {
               Sy-
stem.out.println("Lese Menue");
               readMenu();
               break;
             }
             if
(token.sval.equals("ANALYSISBAR")
) {
               Sy-
stem.out.println("Lese Analyse-
Bar");
               readAnalyse();
               break;
             }
             if
(token.sval.equals("SHORTCUTS"))
{
               Sy-
stem.out.println("Lese Short-
cuts");
               readShorts();
               break;
```

```
                }
                if
(token.sval.equals("ACCELERATOR")
) {
                  Sy-
stem.out.println("Lese Accelera-
tor");
                  readAccel();
                  break;
                }
                default:
              }
            }

    in.close();
    System.out.flush();
    System.out.println("EINLESEN
DER DATEI " +configFile + "
FERTIG!");
    //und wichtig für die Anzei-
ge:
    setLayer();
    setAttributNames();
    } catch
(FileNotFoundException e) {
       System.err.println( con-
figFile + " is not found");
    } catch (IOException e) {
       e.printStackTrace();
    }
  }

  private void readToolbar(String
lgcPath) {
    int c ='{';
    gobjekte.clear();
    //System.out.println("Jetzt
kommt die Toolbar");
    try {
      while (c != '}') {
        switch
(c=token.nextToken()){
          case StreamTokeni-
zer.TT_WORD:
            if
(token.sval.equals("NODE")) {

//System.out.println("Lese Kno-
ten");
              readNode(lgcPath);
              break;
            }
            if
(token.sval.equals("EDGE")) {

//System.out.println("Lese Kan-
te");
              readEdge(lgcPath);
              break;
            }
          default:
        }
        //c=token.nextToken();
        //System.out.println("IN
der TOOLBAR " +c );
      }
    } catch (IOException e) {
      e.printStackTrace();
    }
    //System.out.println("Fertig
Toolbar");
  }


  private void readNode(String
lgcPath) {
    int c ='{';
    String typname = new
String();
    String image = new String();
    Vector ecken = new Vector();
    Vector konnektoren = new Vec-
tor();
    Vector konnektorNamen = new
Vector();
    Attribute attribute = new
StandardAttribute();
    Color color = new Co-
lor(255,255,255);
    //System.out.println("Ein
Knoten");
    try {
      while (c != '}') {
        switch (c){
          case StreamTokeni-
zer.TT_WORD:
            // Wird nicht mehr be-
notigt
            // if
(token.sval.equals("TYPE")) {
            //
c=token.nextToken();
            //   Sy-
stem.out.println("Lese TYPE" +
token.sval);
            //   break;
            // }
             if
(token.sval.equals("NAME")) {

c=token.nextToken();
              typname = new
String(token.sval);
              // Sy-
stem.out.println("Lese NAME" +
typname);
              break;
            }
            if
(token.sval.equals("ATTRIBUTES"))
{
              attribute = new
StandardAttribute();
```

```
                while
((c=token.nextToken()) != ')') {
                    String aname =
new String(token.sval);
                    c = to-
ken.nextToken();
                    String wert = new
String(token.sval);
                    attribu-
te.addAttribut(aname,wert,true);
                    attributNa-
men.put(aname,aname);
                    // Sy-
stem.out.println("Lese Attribut-
te" + attribute);
                }

                break;
              }
              if
(token.sval.equals("IMAGE")) {

c=token.nextToken();
                image = new
String(token.sval);
                // Sy-
stem.out.println("Lese IMAGE" +
image);
                break;
              }
              if
(token.sval.equals("FILLEDPOLYGON
")) {
                ek-
ken.removeAllElements();
                int x,y;
                while
((c=token.nextToken()) != ']') {
                  x =
(int)token.nval;

c=token.nextToken();
                  y =
(int)token.nval;
                ek-
ken.addElement(new Point(x,y));
                // Sy-
stem.out.println("Lese POLYGON" +
ecken);
              }
              // jetzt sollten
alle Daten da sein, und es
              // kann ein Knoten-
prototyp erzeugt werden.
            GraphObjekt knoten =
new FilledPolygonKnoten(typname,

ecken,

konnektoren,

konnektorNamen,

attribute);
                kno-
ten.setColor(color);
                // Sy-
stem.out.println("Setze Farbe " +
color);
                // Erzeuge Button
mit Werzeug für Werkzeugleiste
                ToolButton b = new
ToolButton(lgcPath + "images/" +
image,

typname,

new KnotenTool(editor,typname),

editor.getToolbar());
                edi-
tor.getToolbar().addToolButton(b)
;
                // Eintrag in die
Hashtabelle
              gobjek-
te.put(typname,knoten);
                // Sy-
stem.out.println("In Hashtabelle:
" + gobjekte);

                break;
              }
              if
(token.sval.equals("POLYGON")) {
                ek-
ken.removeAllElements();
                int x,y;
                while
((c=token.nextToken()) != ']') {
                  x =
(int)token.nval;

c=token.nextToken();
                  y =
(int)token.nval;
                ek-
ken.addElement(new Point(x,y));
                // Sy-
stem.out.println("Lese POLYGON" +
ecken);
              }
              // jetzt sollten
alle Daten da sein, und es
              // kann ein Knoten-
prototyp erzeugt werden.
            GraphObjekt knoten =
new PolygonKnoten(typname,

ecken,

konnektoren,

konnektorNamen,
```

```
attribute);
                kno-
ten.setColor(color);
                // Sy-
stem.out.println("Setze Farbe " +
color);
                // Erzeuge Button
mit Werzeug für Werkzeugleiste
                // Der Button greift
über den typnamen auf den richti-
gen
                // Knoten zu.
                ToolButton b = new
ToolButton(lgcPath + "images/" +
image,

typname,

new KnotenTool(editor,typname),

editor.getToolbar());
                edi-
tor.getToolbar().addToolButton(b)
;
                // Eintrag in die
Hashtabelle
                gobjek-
te.put(typname,knoten);

//System.out.println("In Hashta-
belle: " + gobjekte);

                 break;
               }
               if
(token.sval.equals("FILLEDOVAL"))
{
                 int breite=10;
                 int hoehe=10;
                 while
((c=token.nextToken()) != '}') {
                   breite =
(int)token.nval;

c=token.nextToken();
                    hoehe =
(int)token.nval;
                   // Sy-
stem.out.println("Lese OVAL_FILL"
+ token.nval);
                 }
                 // jetzt sollten
alle Daten da sein, und es
                 // kann ein Knoten-
prototyp erzeugt werden.
                 GraphObjekt knoten
= new FilledOvalKnoten(typname,

hoehe,

breite,

konnektoren,

konnektorNamen,

attribute);
                    kno-
ten.setColor(color);
                    // Sy-
stem.out.println("Setze Farbe " +
color);
                    // Erzeuge Button
mit Werzeug für Werkzeugleiste
                    ToolButton b = new
ToolButton(lgcPath + "images/" +
image,

typname,

new KnotenTool(editor,typname),

editor.getToolbar());
                   edi-
tor.getToolbar().addToolButton(b)
;
                  // Eintrag in die
Hashtabelle
                  gobjek-
te.put(typname,knoten);

//System.out.println("In Hashta-
belle: " + gobjekte);

                  break;
                }
                if
(token.sval.equals("OVAL")) {
                  int breite=10;
                  int hoehe=10;
                  while
((c=token.nextToken()) != '}') {
                    breite =
(int)token.nval;

c=token.nextToken();
                     hoehe =
(int)token.nval;
                    // Sy-
stem.out.println("Lese OVAL" +
token.nval);
                  }
                  // jetzt sollten
alle Daten da sein, und es
                  // kann ein Knoten-
prototyp erzeugt werden.
                  GraphObjekt knoten
= new OvalKnoten( typname,

hoehe,

breite,
```

```
konnektoren,

konnektorNamen,

attribute);
                knoten.setColor(color);
                // System.out.println("Setze Farbe " + color);
                // Erzeuge Button mit Werzeug für Werkzeugleiste
                ToolButton b = new ToolButton(lgcPath + "images/" + image,

typname,

new KnotenTool(editor,typname),

editor.getToolbar());
              editor.getToolbar().addToolButton(b);
              // Eintrag in die Hashtabelle
              gobjekte.put(typname,knoten);

//System.out.println("In Hashtabelle: " + gobjekte);

              break;
            }
            if (token.sval.equals("CONNECTORS")) {
              konnektoren.removeAllElements();
              int x,y;
              String name;
              while ((c=token.nextToken()) != '}') {
                x = (int)token.nval;

c=token.nextToken();
                y = (int)token.nval;

c=token.nextToken();
                name = token.sval;
                konnektoren.addElement(new Point(x,y));
                konnektorNamen.addElement(name);
                // System.out.println("Lese Konnektoren" + konnektoren);
                // System.out.println("Die Namen: " + konnektorNamen);
              }
              break;
            }
            if (token.sval.equals("COLOR")) {

c=token.nextToken();

//System.out.println("Lese COLOR" + token.nval);
              int r = (int)token.nval;

c=token.nextToken();

//System.out.println("Lese COLOR" + token.nval);
              int g = (int)token.nval;

c=token.nextToken();

//System.out.println("Lese COLOR" + token.nval);
              int b = (int)token.nval;
              color = new Color(r,g,b);
              break;
            }
          default:
        }//switch
        c=token.nextToken();
        // System.out.println("NAECHSTES TOKEN" + token.sval);
      } //while
      //c=token.nextToken();
    } catch (IOException e) {
      e.printStackTrace();
    }
    // System.out.println("Bende readNode");

  }//readNode


  private void readEdge(String lgcPath) {
    // System.out.println("Eine Kante");
    int c ='[';
    String typname = new String();
    String image = new String();
    Attribute attribute = new StandardAttribute();
```

```
    Color color = new Co-
lor(255,255,255);
    try {
      while (c != '}') {
        switch (c){
          case StreamTokeni-
zer.TT_WORD:

            if
(token.sval.equals("NAME")) {

c=token.nextToken();
              typname = new
String(token.sval);
              // Sy-
stem.out.println("Lese NAME" +
typname);
              break;
            }
            if
(token.sval.equals("ATTRIBUTES"))
{
              attribute = new
StandardAttribute();
              while
((c=token.nextToken()) != '}') {
                String aname =
new String(token.sval);
                c = to-
ken.nextToken();
                String wert = new
String(token.sval);
                attribu-
te.addAttribut(aname,wert,true);
                attributNa-
men.put(aname,aname);
                // Sy-
stem.out.println("Lese Attribut-
te" + attribute);
              }

              break;
            }
            if
(token.sval.equals("IMAGE")) {

c=token.nextToken();
              image = new
String(token.sval);
              // Sy-
stem.out.println("Lese IMAGE" +
image);
              break;
            }
            if
(token.sval.equals("ARROW")) {
              int radius = 10;
              int winkel = 10;
              while
((c=token.nextToken()) != '}') {
                radius =
(int)token.nval;

c=token.nextToken();
                winkel =
(int)token.nval;
                // Sy-
stem.out.println("Lese Arrow" +
radius+ winkel);
              }
              // jetzt sollten
alle Daten da sein, und es
              // kann ein Kanten-
prototyp erzeugt werden.
              GraphObjekt kante =
new PfeilKante(typname,

radius,

winkel,

attribute);
              kan-
te.setColor(color);
              // Sy-
stem.out.println("Setze Farbe " +
color);
              // Erzeuge Button
mit Werzeug für Werkzeugleiste
              ToolButton b = new
ToolButton(lgcPath + "images/" +
image,

typname,

new KantenTool(editor,typname),

editor.getToolbar());
              edi-
tor.getToolbar().addToolButton(b)
;
              // Eintrag in die
Hashtabelle
              gobjek-
te.put(typname,kante);

//System.out.println("In Hashta-
belle: " + gobjekte);

              break;
            }
            if
(token.sval.equals("POINT")) {
              int durch = 10;
              while
((c=token.nextToken()) != '}') {
                durch =
(int)token.nval;
              // Sy-
stem.out.println("Lese Point" +
durch);
              }
              // jetzt sollten
alle Daten da sein, und es
```

```
                // kann ein Kanten-
prototyp erzeugt werden.
                GraphObjekt kante =
new KreisKante(typname,

durch,

attribute);
                kan-
te.setColor(color);
                // Sy-
stem.out.println("Setze Farbe " +
color);
                // Erzeuge Button
mit Werzeug für Werkzeugleiste
                ToolButton b = new
ToolButton(lgcPath + "images/" +
image,

typname,

new KantenTool(editor,typname),

editor.getToolbar());
                edi-
tor.getToolbar().addToolButton(b)
;
                // Eintrag in die
Hashtabelle
                gobjek-
te.put(typname,kante);

//System.out.println("In Hashta-
belle: " + gobjekte);

                break;
              }
              if
(token.sval.equals("NOEND")) {

                while
((c=token.nextToken()) != ']') {
                 // durch =
(int)token.nval;
              // Sy-
stem.out.println("Lese Point" +
durch);
                }
                // jetzt sollten
alle Daten da sein, und es
                // kann ein Kanten-
prototyp erzeugt werden.
                GraphObjekt kante =
new StandardKante(typname,

attribute);
                kan-
te.setColor(color);
                // Sy-
stem.out.println("Setze Farbe " +
color);
                // Erzeuge Button
mit Werzeug für Werkzeugleiste
                ToolButton b = new
ToolButton(lgcPath + "images/" +
image,

typname,

new KantenTool(editor,typname),

editor.getToolbar());
                edi-
tor.getToolbar().addToolButton(b)
;
                // Eintrag in die
Hashtabelle
                gobjek-
te.put(typname,kante);

//System.out.println("In Hashta-
belle: " + gobjekte);

                break;
              }

              if
(token.sval.equals("SIZE")) {

c=token.nextToken();
                Sy-
stem.out.println("Lese SIZE" +
token.nval);
                break;
              }
              if
(token.sval.equals("COLOR")) {

//System.out.println("Lese COLOR"
+ token.nval);

c=token.nextToken();
                int r =
(int)token.nval;

c=token.nextToken();

//System.out.println("Lese COLOR"
+ token.nval);
                int g =
(int)token.nval;

c=token.nextToken();

//System.out.println("Lese COLOR"
+ token.nval);
                int b =
(int)token.nval;
                color = new Co-
lor(r,g,b);
                // Sy-
stem.out.println("Gelesene Farbe:
" + color);
```

```
            break;
          }
        default:
      }//switch
      c=token.nextToken();
      // Sy-
stem.out.println("NAECHSTES
TOKEN" + token.sval);
    } //while
    //c=token.nextToken();
  } catch (IOException e) {
     e.printStackTrace();
  }
  // System.out.println("Bende
readEdge");

}//readEdge


private void readMenu() {
  tools.clear();
  int c = '{';
  try {
    while
((c=token.nextToken()) != '}') {
      //c=token.nextToken();
      String namen = to-
ken.sval;
      System.out.println("Jetzt
kommt das Menu"+ namen);
      c = token.nextToken();
      String aufruf = to-
ken.sval;
      System.out.println("Jetzt
kommt das Menu"+ aufruf);
      tools.put(new
String(namen), new
String(aufruf));
    }
  } catch (IOException e) {
     e.printStackTrace();
  }

}

private void readAnalyse() {
  System.out.println("Jetzt
kommt die Analyse");
}

private void readShorts() {
  System.out.println("Jetzt
kommt die Shortcut");
}

private void readAccel() {
  System.out.println("Jetzt
kommen die Accelerators");
}
```

```
// private void uebergebe
(String mpunkt,String
icon1,String icon2) {
//   public void addBut-
ton(String menuePunkt, String
image1, String image2)

  private void uebergebe(String
auswahl,String name,String style,
int size) {
    int styleInt = 0;
    switch (style.charAt(0)){
      case 'B':
        styleInt = Font.BOLD;
        break;
      case 'P':
        styleInt = Font.PLAIN;
        break;
      case 'I':
        styleInt = Font.ITALIC;
        break;
      default:
        styleInt = Font.PLAIN;
    }
    Font font = new Font(name,
styleInt, size);
    switch (auswahl.charAt(0)){
      case 'M':
        edi-
tor.getMenueleiste().setFont(font
);
        break;
      case 'P':
        //noch zu Implementiern
        break;
      case 'S':
        edi-
tor.getStatusleiste().setFont(fon
t);
        break;
    }
  }

  private void uebergebe(String
auswahl,int r,int g,int b) {
    if (auswahl.equals("PAPER")){
      edi-
tor.getZeichenflaeche().setBackgr
ound(new Color(r,g,b));
    }
    if (auswahl.equals("GRID")){
      //noch zu implementiern
    }
    if
(auswahl.equals("MENUBGC")){
   // edi-
tor.getMenueleiste().setBackgroun
d(new Color(r,g,b));
    }
    if
(auswahl.equals("MENUFGC")){
```

```
    //  menubar.setForeground(new
Color(r,g,b));
    }
    if
(auswahl.equals("STATUSBGC")){
      edi-
tor.getStatusleiste().setBackgrou
nd (new Color(r,g,b));
    }
    if
(auswahl.equals("STATUSFGC")){
      edi-
tor.getStatusleiste().setForegrou
nd(new Color(r,g,b));
    }
    if
(auswahl.equals("TOOLBGC")){
      edi-
tor.getToolbar().setBackground(ne
w Color(r,g,b));
    }
    if
(auswahl.equals("TOOLFGC")){
      edi-
tor.getToolbar().setForeground
(new Color(r,g,b));
    }
    if
(auswahl.equals("SHORTCUTBGC")){
      edi-
tor.getShortcutleiste().setBackgr
ound(new Color(r,g,b));
    }
    if
(auswahl.equals("SHORTCUTFGC")){
      edi-
tor.getShortcutleiste().setForegr
ound (new Color(r,g,b));
    }
  }

  /**
   * Liefert eine Kopie eines
GraphObjektes
   * zurück.
   */
  public GraphObjekt getOb-
jekt(String name) {
    if
(gobjekte.containsKey(name)) {
      GraphObjekt vater =
(GraphObjekt)gobjekte.get(name);
      return
(GraphObjekt)vater.copy();
    } else {
      return null;
    }
  }

  /**
   * Diese Methode fügt alle an-
zeigbaren ObjekteTypen in die
   * Hashtable der Klasse Gra-
phObjekt ein,
   * -> alle Objekte werden ange-
zeigt.
   */
  public void setLayer() {
    Hashtable alle = new Has-
htable(gobjekte.size(),1.0f);
    Enumeration e = gobjek-
te.keys();
    while (e.hasMoreElements())
{
      String key =
(String)e.nextElement();
      alle.put(key,new
String(key));
    }
    GraphObjekt.toShow = alle;
  }

  /**
   * Liefert alle anzeigbaren
Layers zurück.
   */
  public Enumeration getLayers()
{
    return gobjekte.keys();
  }

  /**
   * Liefert die maximale Anzahl
der Layers zurück.
   */
  public int countLayers() {
    return gobjekte.size();
  }

  /**
   * Diese Methode fügt alle an-
zeigbaren AttributNamenn in die
   * Hashtable der Klasse Attri-
bute ein,
   * -> alle Attribute werden an-
gezeigt.
   */
  public void setAttributNames()
{
    Hashtable alle = new Has-
htable(attributNamen.size(),1.0f)
;
    Enumeration e = attributNa-
men.keys();
    while (e.hasMoreElements())
{
      String key =
(String)e.nextElement();
      alle.put(key,new
String(key));
    }
    Attribute.toShow = alle;
  }
```

```
   /**
    * Liefert alle anzeigbaren
AttributNamen zuruck.
    */
   public Enumeration getAttri-
butNames() {
     return attributNamen.keys();
   }

   /**
    * Liefert die maximale Anzahl
der Attribute zurück.
    */
   public int countAttributNa-
mes() {
     return attributNamen.size();
   }

   /**
    * Fügt einen Attribut namen
in die
    * Hashtabel ein.
    */
   public void addAttributName (
String name) {
     attributNamen.put(new
String(name), new String(name));
   }

   /**
    *
    */
   public Hashtable getTools() {
     return tools;
   }

 // public String getConfigFile()
{
  //  return configFile;
 // }
}
```

2."load" file

```
package commands;

import etc.*;
import java.util.*;
import java.awt.*;
import java.io.*;
import interfaces.*;

/**
 * Ladt einen Graphen aus einer
.lgf Datei.
 */
public class Load extends Befehl
{
  Vector undo;

  public Load(GraphEditor edi-
tor){
    super(editor);
    undo=new Vector();
    help =
"<filename.lgf/.lgc/.lgt>";
  }


  public void ausfuehren(String[]
param){
    //System.out.println(param);
    int anzahl = param.length;
    switch (anzahl) {
      case 0  : // bei keinem Ar-
gument tun wir nichts.
                break;
      case 1  : // bei einen Ar-
gument wird erst nachgeschaut!
                if
(param[0].endsWith(".lgc") ||
                    pa-
ram[0].endsWith(".lgf") ||
                    pa-
ram[0].endsWith(".lgt") ) {
                    // wir wurden
von der CommandoZeile aufgerufen
                    File file = new
File(param[0]);

//System.out.println("Der Pfad :
" + file.getParent());

//System.out.println("Der Name :
" + file.getName());
                    prue-
fe(file.getParent()+"/",file.getN
ame());
                } else {
                  //nothing
                }
                break;
      default : //zuviel Parame-
ter
                break;
    }//switch
  }

  public void ausfuehren(String
param){
    edi-
tor.getStatusleiste().show("Load.
..");

((Component)editor).setCursor(Cur
```

```
sor.getPredefinedCursor(Cursor.WA
IT_CURSOR));
    FileDialog fd = new FileDia-
log((Frame)editor,null,FileDialog
.LOAD);
    // das hat leider noch keine
Auswirkungen in Windows und Sola-
ris
    // ab 1.1.6 gehts doch

fd.setDirectory(System.getPropert
y("user.dir"));
    // das schon
    fd.setFile("noname.lgf");
    FilenameFilter filter = new
lgFilter();
    fd.setFilenameFilter(filter);
    fd.show();
    String dir =
fd.getDirectory();
    String file = fd.getFile();
    // fd.getFile() liefert null
bei Abbruch!
    if (file == null) {
      // nichts zu tun

((Component)editor).setCursor(Cur
sor.getDefaultCursor());
      return;
    } else {
      // laden

//System.out.println(fd.getDirect
ory());

//System.out.println(fd.getFile()
);
      Vector ge-
loescht=editor.getGraph().removeA
ll();
      pruefe(dir,file);
      edi-
tor.getGraph().setChanged(false);
      editor.setAuswahl(new Vec-
tor());
      Vector lastCommands = edi-
tor.getLastCommands();
      if (lastCommands.size() <
10) {
        lastCom-
mands.addElement(this);
      } else {
        lastCom-
mands.removeElementAt(0);
        lastCom-
mands.addElement(this);
      }
      if (undo.size() < 10) {

undo.addElement(geloescht);
      } else {
        undo.removeElementAt(0);

undo.addElement(geloescht);
      }
    }//else
    edi-
tor.getZeichenflaeche().drawBuffe
r(editor.getGraph());

((Component)editor).setCursor(Cur
sor.getDefaultCursor());
    edi-
tor.getStatusleiste().show("Done"
);
  }
  /**
   * Macht Datei laden rückgän-
gig.
   */
  public void undo() {
    edi-
tor.getStatusleiste().show("Undo:
Load...");

((Component)editor).setCursor(Cur
sor.getPredefinedCursor(Cursor.WA
IT_CURSOR));
    if (!undo.isEmpty()) {
      Vector insert =
(Vector)undo.lastElement();
      if (insert != null) {
        edi-
tor.getGraph().removeAll();
        edi-
tor.getGraph().add(insert);

insert.removeAllElements();
      }

undo.removeElement(undo.lastEleme
nt());
    }
    edi-
tor.getZeichenflaeche().drawBuffe
r(editor.getGraph());
    edi-
tor.getGraph().setChanged(true);
    edi-
tor.getStatusleiste().show("Done"
);

((Component)editor).setCursor(Cur
sor.getDefaultCursor());
  }//undo

  /**
   * Wiederholt Datei laden..
   */
  public void redo() {
    edi-
tor.getStatusleiste().show("Redo:
Load...");
    ausfuehren();
```

```
  }// redo

  /**
   * Diese Klasse wird leider
nicht an
   * die Windows bzw Solaris Kom-
ponente
   * weitergereicht.
   */
  class lgFilter implements Fi-
lenameFilter {
    public boolean accept (File
dir, String name) {
      return ( na-
me.endsWith(".lgf") ||
               na-
me.endsWith(".lgc") ||
               na-
me.endsWith(".lgt")  );
    }
  }
  /**
   * Diese Methode überpruft, ob
die richtige
   * Konfigurationsdatei geladen
ist, ansonsten wird
   * versucht die richtige zu la-
den.(->Editor zurücksetzen)
   * Dannach wird die gewünschte
.lgt oder .lgf Datei
   * geladen.
   */
  private void pruefe (String
pfad, String datei) {
    Einstellungen settings= edi-
tor.getEinstellungen();
   if (datei.endsWith(".lgc")) {
      //System.out.println("eine
lgc Datei");
      File f = new File(pfad +
datei);
      if (f.exists()) {
        settings.appName = Ein-
stellungen.format(datei);
        settings.fileName=" ";
        settings.frameName = set-
tings.fileName+ "  "
+settings.appName + "  "
+settings.copyright;
        settings.configFile = new
String(datei);
        settings.lgcPath = new
String(pfad);
        //wir Starten den Editor
neu
        editor.start();
      } else {
        System.err.println("File
not found : "+ settings.lgcPath +
datei);
      }
    } else if
(datei.endsWith(".lgf")) {
      //System.out.println("eine
lgf Datei");
      File f = new File(pfad +
datei);
      if (f.exists()) {
        settings.fileName = da-
tei;
        // wir holen uns noch den
namen des .lgc Files:
        String config = edi-
tor.getDateischnittstelle().getCo
nfig(pfad + datei);
        //System.out.println("Der
neue Name der Lgc datei " + con-
fig);
        f = new
File(settings.lgcPath + config);
        if (f.exists()) {
          // ist diese lgc Datei
schon geladen?
          if
(settings.configFile.equals(confi
g)) {
            //wir muessen nur die
lgf Datei laden
            edi-
tor.getDateischnittstelle().load(
pfad,datei,editor.getGraph());
            settings.frameName =
settings.fileName+ "  "
+settings.appName + "  "
+settings.copyright;
            ((Frame)editor). set-
Title(settings.frameName);
          } else {
            // wir müssen auch
die Konnfigurationsdatei laden
            settings.appName =
Einstellungen.format(config);
            settings.configFile =
new String(config);
            settings.frameName =
settings.fileName+ "  "
+settings.appName + "  "
+settings.copyright;
            //wir Starten den
Editor neu
            editor.start();
            edi-
tor.getDateischnittstelle().load(
pfad,datei,editor.getGraph());
          }
        } else {
          Sy-
stem.err.println("File not found
: " + settings.lgcPath + config);
        }
      } else {
        System.err.println("File
not found : " + pfad + datei);
```

```
      }
      //start();
    } else if
(datei.endsWith(".lgt")) {
      //System.out.println("eine
lgt Datei");
      File f = new File(pfad +
datei);
      if (f.exists()) {
        settings.fileName = da-
tei;
        settings.frameName = set-
tings.fileName+ "  "
+settings.appName + "  "
+settings.copyright;
        // wir holen uns noch den
namen des .lgc Files:
        //String config = edi-
tor.getDateischnittstelle().getCo
nfig(pfad + datei);
        //System.out.println("Der
neue Name der Lgc datei " + con-
fig);
        //f = new
File(settings.lgcPath + config);
        //if (f.exists()) {
          // ist diese lgc Datei
schon geladen?
          //if
(settings.configFile.equals(confi
g)) {
            //wir muessen nur die
lgt Datei laden und interpretie-
ren
            LgtInterpreter inter-
preter=editor.getInterpreter();

//System.out.println("Der Inter-
preter : " + interpreter);
            if (interpreter ==
null) {
              interpreter = new
LgtInterpreter(editor,pfad + da-
tei);
              edi-
tor.setInterpreter(interpreter);
              interpre-
ter.start();
            } else {
              interpre-
ter.setFile(pfad + datei);
            }

//Dateischnittstelle().load(pfad,
datei,editor.getGraph());
            //settings.frameName
= settings.appName + "  " + set-
tings.fileName;
            //((Frame)editor).
setTitle(settings.frameName);
          // } else {
            // wir mussen auch
die Konnfigurationsdatei laden
          // settings.appName =
Einstellungen.format(config);
            //settings.configFile
= new String(config);
            //settings.frameName
= settings.appName + "  " + set-
tings.fileName;
            //wir Starten den
Editor neu
            //editor.start();
          // LgtInterpreter in-
terpreter = new LgtInterpre-
ter(editor,pfad + datei);
            // edi-
tor.setInterpreter(interpreter);
          //  interpre-
ter.start();
          // }
        //} else {
        //   Sy-
stem.err.println("File not found
: " + settings.lgcPath + config);
          //}
      } else {
        System.err.println("File
not found : " + pfad + datei);
      }
    } else {
      System.err.println("usage:
java LoGraph2 <path to config-
files> AND <file.lgc> OR
<file.lgf> OR <file.lgt>");
    }
  }

}
```

3."toolbar" file

```
package mmi;

import java.awt.*;
import java.awt.event.*;

import etc.*;
import tools.*;

/**
 * Über das aktuelle Tool der
Toolbar werden die
 * Maus Aktionen des Benutzers an
den Graphen weitergegeben.
```

```
 * Die Toolbar ermöglicht das
hinzufügen und entfernen
 * von ToolButtons, und deren zu-
gehörigen ActionListener.
 */
public class Toolbar extends Pa-
nel {
  GraphEditor editor;
  Tool currentTool;
  ToolButton currentButton;
  int borderSize = 4;
  /**
   * Der Konstruktor erzeugt das
AuswahlTool,
   * da dieses immer vorhanden
sein sollte.
   */
  public Toolbar(GraphEditor edi-
tor){
    this.editor = editor;
    setLayout(new BarLay-
out(BarLayout.VERTIKAL,2));
    setBackgro-
und(editor.getEinstellungen().too
lbarBgCo);
    // eine kleine Lücke
    add(new Space(5,24));

    ToolButton b = new ToolBut-
ton(editor.getEinstellungen().lgc
Path +

"images/auswahl.gif",

"Select",

new AuswahlTool(editor),this);
    setCurrentTool(b.getTool());
    setCurrentButton(b);
    add(b);
    add(new Space(5,24));
  }


  public Insets getInsets() {
    Insets insets =
(Insets)(super.getInsets()).clone
();
    insets.top += borderSize;
    insets.left +=
(borderSize+2);
    insets.bottom += borderSize;
    insets.right +=
(borderSize+2);
    return insets;
  }

  public void paint(Graphics g) {
    super.paint(g);
    Insets insets = su-
per.getInsets();
    int w = getSize().width-
insets.left-insets.right;
    int h = getSize().height-
insets.top-insets.bottom;

g.setColor(editor.getEinstellunge
n().toolbarBgCo);
    for (int i=0; i<borderSize;
i++) {

g.draw3DRect(i+insets.left,i+inse
ts.top,
                        w-2*i-1, h-
2*i-1, i<borderSize/2);
    }
  }

  /**
   * Fügt einen ToolButton hinzu.
   */
  public void addToolBut-
ton(ToolButton button) {
    add(button);
  }

  /**
   * Entfernt einen ToolButton.
   */
  public void deleteTooleBut-
ton(ToolButton button) {
  }

  /**
   * Setzt das aktuelle Tool;
   * wird normalerweise von den
ToolButtons aufgerufen.
   */
  public void setCurrentTool(Tool
currentTool) {
    this.currentTool = current-
Tool;
    this.currentTool.reset();
  }

  /**
   * Setzt den aktuellen Button,
damit der nächste
   * aktuelle Butten ihn zurück-
setzen kann.
   */
  public void setCurrentBut-
ton(ToolButton currentButton) {
    if (this.currentButton !=
null)
      this.currentButton.setUp();
    this.currentButton = current-
Button;
    this.currentButton.setDown();

  }

  /**
```

```
   * Liefert das aktuelle Tool
zurück.
   * wird normalerweise von den
Zeichenfläche aufgerufen.
   */
  public Tool getCurrentTool() {
    return currentTool;
  }

  /**
   * Liefert den aktuellen But-
ton, damit der nächste
   * aktuelle Butten ihn zuruck-
setzen kann.
   */
  public ToolButton getCurrent-
Button() {
    return currentButton;
  }

  /**
   * Liefert den Editor an die
Buttons weiter.
   */
  public GraphEditor getEditor()
{
    return editor;
  }

}//Toolbar
```

This redlined draft, generated by CompareRite (TM) - The Instant Redliner, shows the differences between -
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CompareRite found 183 change(s) in the text

Deletions appear as Overstrike text surrounded by []
Additions appear as Bold-Underline text

~~[Description]~~ **SPECIFICATION**

~~[Method for determining a graphic structure of a technical system and arrangement and set of arrangements for determining]~~ **TITLE**

METHOD FOR DETERMINING A GRAPHIC STRUCTURE OF A TECHNICAL SYSTEM AND ARRANGEMENT AND SET OF ARRANGEMENTS FOR DETERMINING A GRAPHIC STRUCTURE

BACKGROUND OF THE INVENTION

Field of the Invention

1 **The invention relates to the selection of elements of** a graph structure **file in order to describe the structure of a techical system graphically.**

Description of the Related Art

2 It is known to describe different technical systems by means of a graphic structure. **Such descriptions are known from, for example, product brochures for products provided by Zuken-Redac (e.g., Analysis Products, CAD Products, CAE Products, CAM Products, and Data Conversion Products—formerly available on September 22, 1998 at http://www.redac.co.uk/prod_info/brochures/14a.html) (the Zuken-Redac brochures), herein incorporated by reference, that disclose**~~[[1] discloses]~~ how, for a technical system such as an electronic circuit, the electrical circuit is determined in the form of a graphic structure with elements which describe an electronic circuit.

3 Elements of a ~~[graph]~~ **graphic** structure in the field of a circuit simulation are

symbols which symbolize electronic components, for example, a resistor, a capacitor, an inductor, a transistor, an operational amplifier or other electronic components composed of these elements.

4 In the method ~~[known from [1]]~~ and ~~[the]~~ arrangement known from ~~[[1]]~~ **the Zuken-Redac brochures**, elements for graphically describing an electronic circuit which are made available to a user by an editor program are selected in such a way that the "electronic circuit" constituting the technical system is described using the selected elements. The elements are represented by the editor program.

5 A ~~[graph]~~ **graphic** structure describes a ~~[graph]~~ **graphic** G (= V, E, Ψ) which has a finite, non-empty set V ($v \in \blacksquare V$ designate nodes of the ~~[graph]~~ **graphic** G), and a finite set E ($e \in \blacksquare E$ designate edges of the ~~[graph]~~ **graphic** G). The nodes and edges of the ~~[graph]~~ **graphic** are logically combined by an incidence function Ψ which is formed according to the following rule:

$$\Psi: E \rightarrow \{\{i, j\} \mid i, j \in \blacksquare V\} \qquad (1)$$

6 Each edge e of the set E of edges is assigned its two end places by the incidence function $\Psi(e)$.

7 Depending on the field of application, different types of nodes and edges may be provided in an editor program for describing a technical system. Nodes and edges to which an application-dependent semantic is assigned are generally designated as elements of the ~~[graph]~~ **graphic** in an editor program. A node element of a ~~[graph]~~ **graphic** is, for example in the editor program in ~~[[1]]~~ **the Zuken-Redac brochures**, a symbol which symbolizes an electronic component of the electronic circuit. The edges can be used to describe weighted connections between the individual elements. Generally, the respective nodes and edges can be assigned a weight, a value or any desired text for information (textual information).

~~[[2]]~~ **8 G. Chiola, G. Franceschinis, R. Gaeta and M. Ribaudo, GreatSPN 1.7: Graphical Editor and Analyzer for Timed and Stochastic Petri Nets, Performance Evaluation, special issue on Performance Modeling Tools, 24 (1&2), pp. 47 - 68, November 1995 (Chiola), herein incorporated by reference,** discloses an editor program for determining a Petri net. A Petri net is preferably used to analyze and design a closed-loop control system or an open-loop control system of a technical system, generally for describing system characteristics of a technical

system. A ~~[graph]~~ **graphic**, which is illustrated in the form of a Petri net, has a place S or a transition T as elements. A general overview of a Petri net and its basic elements can be found in ~~[[3].~~

]G. Schmidt, Grundlagen der Regelungstechnik: Analyse und Entwurf linearer und einfacher nichtlinearer Regelungen sowie diskreter Steuerungen [Principles of control technology: analysis and design of linear and simple nonlinear closed-loop controls and discrete open-loop controls], second edition, Springer-Verlag [Publishing House], ISBN 3-540-17112-6, Berlin, pp. 320 - 328, 1991 (Schmidt), herein incorporated by reference.

9 A Petri net is generally a triplet

$$N := < S, T, F >$$

where

(i) $S = \{ s1 , s2 , ... , sn \}$	Set of places
(ii) $T = \{ t1 , t2 , ... , tm \}$	Set of transitions
(iii) $S \cap T = \varnothing$	S and T disjunctive (the node set is composed of S and T)
(iv) $F \subseteq (SxT) \cup (TxS)$	Flow relation

10 A **particular** disadvantage with the known methods and arrangements is ~~[in particular]~~ the fact that in each case elements of a ~~[graph]~~ **graphic** which are provided only for a specific application are made available as a function of the application in order to determine the graphic structure of a technical system. Thus, with the editor program from ~~[[1]]~~ **the Zuken-Redac brochures**, only a selection of the elements can be made to describe an electronic circuit, and in the case of the editor program from ~~[[2]]~~ **Chiola,** only a selection of elements can be made to describe a Petri net.

11 Such a known editor program is thus extremely inflexible in a situation in which a user wishes to use different types of a graphic structure to describe a technical system. ~~[It is then]~~ **In this type of program, it is** necessary to develop for each specific application a separate editor program which is adapted to the application, something which entails considerable development costs.

SUMMARY OF THE INVENTION

12 The invention is therefore based on [~~the problem of disclosing~~] **providing** a method for determining a graphic structure of a technical system, and an arrangement and a set of a plurality of arrangements for determining a [~~graph~~] **graphic** structure which has improved flexibility in comparison with the known methods and arrangements.

13 The problem is solved by **a** [~~means of the method, the arrangement and the set of arrangements according to the features of the independent patent claims. A~~] method for determining a graphic structure of a technical system **(which may be an electronic circuit or a piece of technical equipment)** has the following steps:

14 a) a [~~graph~~] **graphic** structure file is selected from a set of a plurality of different [~~graph~~] **graphic** structure files, a [~~graph~~] **graphic** structure file containing, in each case, indications of which elements can be selected to represent [~~it~~] **the graphic structure file** in order to describe the structure of the technical system graphically,

15 b) elements are selected in such a way that a technical system is described using the selected elements, and

16 c) the elements are represented by an editor program into which the selected [~~graph~~] **graphic** structure file has been integrated, [~~by~~] **via** which [~~means~~] the graphic structure of the technical system is determined.

[~~An~~] **17** **The problem is also solved by an** arrangement for determining a [~~graph~~] **graphic** structure has the following features:

18 a) a memory in which a set of a plurality of different [~~graph~~] **graphic** structure files are stored, a [~~graph~~] **graphic** structure file containing, in each case, indications of which elements can be selected to represent it in order to form a [~~graph~~] **graphic**,

19 b) a selector unit with which a [~~graph~~] **graphic** structure file can be selected from the set of [~~graph~~] **graphic** structure files,

20 c) a processor [~~which is~~] configured [~~in such a way that~~] **to execute** an editor program [~~can be executed~~], with which editor program a [~~graph~~] **graphic** structure file selected from the set of [~~graph~~] **graphic** structure files can be used to determine a [~~graph~~] **graphic** with elements of the selected [~~graph~~] **graphic** structure file, by which means the [~~graph~~] **graphic** structure is determined, and

21 d) a representation component which is coupled to the editor program and

with which the specific [~~graph~~] **graphic** structure can be represented.

22 **In the inventive method, the elements may be graphic elements of a graphic which desribes the technical system. Also, a further step of checing the graphic structure of the technical system for predefined structure rules may be provided as well.**

23 A set of a plurality of arrangements for determining a [~~graph~~] **graphic** structure has:

24 a) a first arrangement which has a memory in which a set of a plurality of different [~~graph~~] **graphic** structure files are stored, a [~~graph~~] **graphic** structure file containing in each case indications of which elements can be selected to represent it in order to form a [~~graph~~] **graphic**, and

25 b) a second arrangement which is coupled to the first arrangement and has the following components:

26 - a selector unit with which a [~~graph~~] **graphic** structure file can be selected from the set of [~~graph~~] **graphic** structure files,

27 - an editor program with which a [~~graph~~] **graphic** structure file selected from the set of [~~graph~~] **graphic** structure files can be used to determine a [~~graph~~] **graphic** with elements, of the selected [~~graph~~] **graphic** structure file, [~~by~~] **via** which [~~means~~] the [~~graph~~] **graphic** structure is determined, **and**

28 - a representation component which is coupled to the editor program and with which the specific [~~graph~~] **graphic** structure can be represented.

29 The invention discloses a method which is very flexible in comparison with the known methods and arrangements, and a very flexible arrangement for determining a graphic structure which can be adapted to new application scenarios in a quick and [~~uncomplicated~~] **easy** way[~~,~~] and can be adapted more satisfactorily to existing application scenarios.

30 In this way, different types of structures which can be represented as a [~~graph~~] **graphic** can be processed flexibly, cost-effectively, and easily with [~~a~~] **the inventive** method or [~~with an~~] arrangement.

[~~Preferred developments of the invention emerge from the dependent claims.~~

]**31** **These inventive aspects are described in more detail below.**

32 The technical system is preferably an electronic circuit or a piece of technical equipment. The elements are preferably [~~graph~~] **graphic** elements of a [~~graph~~]

graphic which describe the technical system.

33 In a further refinement there is provision for the graphic structure of the technical system which is determined to be checked for predefined structure rules. In this way, it is possible to check a structure of the technical system determined by a user for predefined structure rules, which ensures that the structure rules for the respective technical system are complied ~~[with in]~~ **within** terms of its graphic structure.

~~[Such a]~~ **34** **An exemplary** structure rule ~~[is]~~ **could be**, for example, in a Petri net, the fact that a place must always follow a transition, and vice versa. If this is not the case, within the scope of this development, the disclosure is made during checking of the graphic structure of a Petri net that the corresponding structure rule is infringed.

BRIEF DESCRIPTION OF THE DRAWINGS

35 An exemplary embodiment of the invention is illustrated in the figures and explained in more detail below.

~~[In said figures:~~

~~]~~**36** Figure 1 ~~[shows an outline of]~~ **is a schematic diagram showing** an arrangement according to a first exemplary embodiment;

37 Figure 2 ~~[shows an outline]~~ **is a pictorial diagram** of a representation component with a graphic structure with elements of a Petri net;

38 Figure 3 ~~[shows an outline]~~ **is a pictorial diagram** of a representation component with a graphic structure with elements which describe an electronic circuit;

39 Figure 4 ~~[shows]~~ **is** a flowchart in which the method steps of the method according to an exemplary embodiment are represented; **and**

40 Figure 5 ~~[shows]~~ **is a block diagram of** a set of a plurality of arrangements which, according to a second exemplary embodiment, are coupled to one another ~~[by means of]~~ **via** a communications network.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

41 Fig. 1 shows an arrangement 100 with a set 101 of a plurality of different graphic structure files 102, 103, 104, 105. Each graphic structure file 102, 103, 104,

105 is embodied as a file which can be linked dynamically (dynamic link library).

42 A user 106 selects a graphic structure file 102, 103, 104, 105 using a selection component 108 (keyboard and/or computer mouse) which is connected to an editor program 107.

43 The selected graphic structure file, in this exemplary embodiment a first graphic structure file 103, is dynamically integrated into the editor program 107.

44 After integration into the editor program 107, a set 111 of selectable elements 112, 113, 114, which are defined in the first graphic structure file 103 as selectable elements for determining a further described ~~[graph]~~ **graphic** is displayed to the user 106 on a screen 110 ~~[by means of]~~ **via** a representation component 109 which is connected to the editor program 107. In addition, in this exemplary embodiment, according to the first graphic structure file 103, a first check program 115 and a second check program 116 are integrated into the editor program 107 and made available to the user 106 for selection.

45 Each graphic structure file 102, 103, 104, 105 has, in each case, a set of selectable elements for the respective type of ~~[graphs]~~ **graphics**, in each case a graphic structure file being provided for one type of ~~[graph]~~ **graphic**. In addition, each graphic structure file 102, 103, 104, 105 may respectively contain a specific check program which is integrated into the respective graphic structure file 102, 103, 104, 105.

46 After the first graphic structure file 103 has been integrated, elements of the ~~[graph]~~ **graphic** are selected by the user 106 and connected to one another so that a ~~[graph]~~ **graphic** is determined which is stored in the form of a predefined intermediate language 117 in a memory 118.

47 In addition, ~~[it is symbolically represented in Fig. 1]~~**Fig. 1 symbolically represents** that the user 106 stores a plurality of structures 119, 120, 121, 122, 123 for describing different ~~[graphs, said]~~ **graphics, these** structures relating to the type of ~~[graph]~~ **graphic** predefined by the first graphic file 103. The first graphic structure file 103 makes available elements which make possible a ~~[graph]~~ **graphic** in the form of a Petri net 201 (see Fig. 2).

48 Fig. 2 shows the representation component 200 which is presented to the user 106 in the form of a screen surface. The screen surface 200 has a menu list 202 with different selectable options ("File", "Edit", "Object", "View", "Tools",

"Settings", "Help"). Menu items are made available to the user by means of individual selectable elements using an immediate access bar 203 by making a single, direct selection of an element.

49 In addition, a processing bar 204 is represented with selectable options for determining the ~~[graph]~~ **graphic**. Thus, in the first graphic structure file 103, a first selection element 205 is provided with which it is possible to select and process objects represented on the screen. The selection and processing of specific elements for a Petri net 201 is made available to the user 106 ~~[by means of]~~ **via** a set 206 of further selector elements which will be explained in more detail below.

50 A second selector element 207 is described by ~~[means of]~~ an empty rectangle and symbolizes a time-specific transition. A third selector element 208 symbolizes a timeless transition, which is represented as a selected transition element 220, 221 and 222 in the Petri net 201. A fourth selector element 209 symbolizes an edge which is a directed edge in this exemplary embodiment. A fifth selector element 210 symbolizes a forbidden edge which is designated in accordance with the structure rules of a Petri net 201. A sixth selector element 211 symbolizes a place **where**, in each case, a place element 223, 224, 225, 226 ~~[being]~~ **is** represented in the Petri net 201. The place elements 223, 224, 225 and 226 are connected to the transition elements 220, 221, 222 via edges 227, 228, 229, 230, 231 and 232. A seventh selector element 212 symbolizes the possibility of combining a plurality of elements of the Petri net to form a composite element. An eighth selector element 213 symbolizes an input of the Petri net 201 and a ninth selector element 214 symbolizes an output of a Petri net 201.

51 The edges and the individual nodes, ~~[that is to say]~~ **i.e.,** the elements of the Petri net 201, are assigned textual information 251, 252, 253, 254, 255, 256, 257, 258, 259, 260 and 261. In this way it is possible to assign an additional textual description to the individual elements.

52 If a second graphic structure file 104 is integrated into the editor program 107, the second graphic structure file 104 making available elements of an electronic circuit, and thus a ~~[graph]~~ **graphic** of an electronic circuit, a screen mask represented in Fig. 3 with a set of selector elements set up for the circuit simulation is produced.

53 The same designations are used in Fig. 3 for the same elements displayed on

the screen as represented in Fig. 2.

54 A set 301 of selector elements which are specifically for describing a ~~[graph]~~ **graphic** of an electronic circuit contain **:**

- a tenth selector element 302 which symbolizes an electronic resistor,
- an eleventh selector element 303 which symbolizes an electronic capacitor,
- a twelfth selector element 304 which symbolizes an inductor,
- a thirteenth selector element 305 symbolizing a transistor,
- a fourteenth selector element 306 symbolizing an operational amplifier,
- a fifteenth selector element 307 symbolizing a non-directed edge, and
- a sixteenth selector element 308 symbolizing a power source.

55 An electronic circuit 110 is determined by the user 106 and has, in this exemplary embodiment, a power source 311, electronic resistors 312, 313, electronic capacitors 314 and 315 and an operational amplifier 316 which are each connected to one another ~~[by means of]~~ **via** edges 317. In addition, a ground terminal 318 is illustrated in Fig. 3. The individual circuit elements are assigned textual information 319, 320, 321, 322, 323, 324, 325, 326 for further explaining the electronic circuit 310.

56 Fig. 4 shows the ~~[method in its method steps in order to clarify the method]~~ **inventive method steps**. In a first step (step 401) a graphic structure file 102, 103, 104, 105 is selected from a set 101 of graphic structure files 102, 103, 104, 105. In a second step (step 402), a selection is made of elements which are available in accordance with the graphic structure file 102, 103, 104, 105 which was selected in the previous step (step 401). The selected elements are illustrated by the editor program 107 in a further step (step 403).

57 Fig. 5 shows a first computer 500 with a memory 502 and a processor 503 which are each connected to one another ~~[by means of]~~ **via** a bus 504 and to an input/output interface 501. The first computer 500 is connected to a screen 505, a keyboard 506, and a computer mouse 507 ~~[by means of]~~ **via** the input/output interface 501.

58 In addition, the first computer 500 is connected to further computers 510, 520,

530, 540 and 550 via a communications network 560, in the exemplary embodiment, an ISDN network (Integrated Services Digital Network).

~~[The set 101 of graphic structure files 102, 103, 104, 105 is stored in the first computer 500.~~

~~]~~**59** **The set 101 of graphic structure files 102, 103, 104, 105 is stored in the first computer 500.** The further computers 510, 520, 530, 540 and 550 each also have a processor 513, 523, 533, 543 and 553 and each have a memory 512, 522, 532, 542 and 552. In each case the processor 513, 523, 533, 543 and 553 and the memory 512, 522, 532, 542 and 552 are connected to the communications network via, in each case, a bus 514, 524, 534, 544 and 554 via an input/output interface 511, 521, 531, 541 and 551. In addition, the further computers 510, 520, 530, 540 and 550 are each connected to a screen 515, 525, 535, 545 and 555, to a keyboard 516, 526, 536, 546 and 556 and to a computer mouse 517, 527, 537, 547 and 557.

60 An editor program 508, 518, 528, 538, 548, 558 is stored in each computer 500, 510, 520, 530, 540 and 550. A graphic structure file 102, 103, 104, 105 is selected by a user of a further computer 510, 520, 530, 540 and 550, and requested from the first computer 500 with a request message 570. The first computer 500 transmits the selected graphic structure file 102, 103, 104, 105 in a reply message 580 to the further computer 510, 520, 530, 540 and 550 requesting the graphic structure file 102, 103, 104, 105.

61 The requesting further computer 510, 520, 530, 540 and 550 has thus received the requested graphic structure file 102, 103, 104, 105, and it integrates it into its editor program 518, 528, 538, 548, 558, as described in the first exemplary embodiment.

62 A number of alternatives to the exemplary embodiments described above are illustrated ~~[below]~~ **as follows**: The type of elements which are made available by a graphic structure file is generally freely selectable and depends only on the respective type of ~~[graph]~~ **graphic** to be determined. The technical system can, for example, also be a piece of technical equipment whose characteristics or structure can be described by the ~~[graph]~~ **graphic**. The editor program and the ~~[graph]~~ **graphic** illustrated with the editor program can be used as part of a simulation of the technical system.

~~[The following publications are cited in this document:~~

~~[1] Publication available on the Internet on September 2, 1998 at the address: http://www.redac.co.uk/prod_info/brochures/14a.html~~

~~[2] G. Chiola, G. Franceschinis, R. Gaeta and M. Ribaudo, GreatSPN 1.7: Graphical Editor and Analyzer for Timed and Stochastic Petri Nets, Performance Evaluation, special issue on Performance Modeling Tools, 24 (1&2), pp. 47 - 68, November 1995~~

~~[3] G. Schmidt, Grundlagen der Regelungstechnik: Analyse und Entwurf linearer und einfacher nichtlinearer Regelungen sowie diskreter Steuerungen [Principles of control technology: analysis and design of linear and simple nonlinear closed-loop controls and discrete open-loop controls], second edition, Springer-Verlag [Publishing House], ISBN 3-540-17112-6, Berlin, pp. 320 - 328, 1991~~

~~A way of implementing the exemplary described above is given below,~~] **63 Three files are provided in the Appendix which implement the exemplary embodiments** written in the **C/Java** programming language ~~[C, the implementation being divided into three files:~~]**. These files are: 1) an initialization file, 2) a load file, and 3) a toolbar file.**

~~[1. Initialization file:~~

~~Abstract~~

~~Method for determining a graphic structure of a technical system~~] **64 The above-described method** and arrangement ~~[and set of arrangements for determining a graph structure]~~ **are illustrative of the principles of the present invention. Numerous modifications and adaptations will be readily apparent to those skilled in this art without departing from the spirit and scope of the present invention.**

~~[A graph]~~ ABSTRACT

65 **A graphic** structure file is selected from a set of a plurality of different ~~[graph]~~ **graphic** structure files. A ~~[graph]~~ **graphic** structure file contains in each case indications of which elements can be selected to represent it in order to describe the structure of the technical system graphically. Elements are selected in such a way that the selected elements describe the technical system, and the elements are represented by an editor program into which the selected ~~[graph]~~ **graphic** structure file has been integrated.

Description

Method for determining a graphic structure of a technical system and arrangement and set of arrangements for determining a graph structure

It is known to describe different technical systems by means of a graphic structure.

[1] discloses how, for a technical system such as an electronic circuit, the electrical circuit is determined in the form of a graphic structure with elements which describe an electronic circuit.

Elements of a graph structure in the field of a circuit simulation are symbols which symbolize electronic components, for example a resistor, a capacitor, an inductor, a transistor, an operational amplifier or other electronic components composed of these elements.

In the method known from [1] and the arrangement known from [1], elements for graphically describing an electronic circuit which are made available to a user by an editor program are selected in such a way that the "electronic circuit" constituting the technical system is described using the selected elements. The elements are represented by the editor program.

A graph structure describes a graph G (= V, E, Ψ) which has a finite, non-empty set V ($v \in V$ designate nodes of the graph G), and a finite set E ($e \in E$ designate edges of the graph G). The nodes and edges of the graph are logically combined by an incidence function Ψ which is formed according to the following rule:

$$\Psi: E \rightarrow \{\{i, j\} | i, j \in V\} \qquad (1)$$

Each edge e of the set E of edges is assigned its two end places by the incidence function $\Psi(e)$.

Depending on the field of application, different types of nodes and edges may be provided in an editor program for describing a technical system. Nodes and edges to which an application-dependent semantic is assigned are generally designated as elements of the graph in an editor program.

A node element of a graph is, for example in the editor program in [1], a symbol which symbolizes an electronic component of the electronic circuit. The edges can be used to describe weighted connections between the individual elements.

Generally, the respective nodes and edges can be assigned a weight, a value or any desired text for information (textual information).

[2] discloses an editor program for determining a Petri net. A Petri net is preferably used to analyze and design a closed-loop control system or an open-loop control system of a technical system, generally for describing system characteristics of a technical system. A graph, which is illustrated in the form of a Petri net, has a place S or a transition T as elements. A general overview of a Petri net and its basic elements can be found in [3].

A Petri net is generally a triplet

$N := < S, T, F >$

where

(i)	$S = \{ s1 , s2 , \ldots , sn \}$	Set of places
(ii)	$T = \{ t1 , t2 , \ldots , tm \}$	Set of transitions
(iii)	$S \cap T = \emptyset$	S and T disjunctive (the node set is composed of S and T)
(iv)	$F \subseteq (SxT) \cup (TxS)$	Flow relation

A disadvantage with the known methods and arrangements is in particular the fact that in each case elements of a graph which are provided only for a specific application are made available as a function of the application in order to determine the graphic structure of a technical system. Thus, with the editor program from [1], only a selection of the elements can be made to describe an electronic circuit, and in the case of the editor program from [2] only a selection of elements can be made to describe a Petri net.

Such a known editor program is thus extremely inflexible in a situation in which a user wishes to use different types of a graphic structure to describe a technical system. It is then necessary to develop for each specific application a separate editor program which is adapted to the application, something which entails considerable development costs.

The invention is therefore based on the problem of disclosing a method for determining a graphic structure of a technical system, and an arrangement and a set of a plurality of arrangements for determining a graph structure which has improved flexibility in comparison with the known methods and arrangements.

The problem is solved by means of the method, the arrangement and the set of arrangements according to the features of the independent patent claims.

A method for determining a graphic structure of a technical system has the following steps:

a) a graph structure file is selected from a set of a plurality of different graph structure files, a graph structure file containing in each case indications of which elements can be selected to represent it in order to describe the structure of the technical system graphically,

b) elements are selected in such a way that a technical system is described using the selected elements, and

c) the elements are represented by an editor program into which the selected graph structure file has been integrated, by which means the graphic structure of the technical system is determined.

An arrangement for determining a graph structure has the following features:

a) a memory in which a set of a plurality of different graph structure files are stored, a graph structure file containing in each case indications of which elements can be selected to represent it in order to form a graph,

b) a selector unit with which a graph structure file can be selected from the set of graph structure files,

c) a processor which is configured in such a way that an editor program can be executed, with which editor program a graph structure file selected from the set of graph structure files can be used to determine a graph with elements of the selected graph structure file, by which means the graph structure is determined, and

d) a representation component which is coupled to the editor program and with which the specific graph structure can be represented.

A set of a plurality of arrangements for determining a graph structure has:

a) a first arrangement which has a memory in which a set of a plurality of different graph structure files are stored, a graph structure file containing in each case indications of which elements can be selected to represent it in order to form a graph, and

b) a second arrangement which is coupled to the first arrangement and has the following components:

- a selector unit with which a graph structure file can be selected from the set of graph structure files,

- an editor program with which a graph structure file selected from the set of graph structure files can be used to determine a graph with elements, of the selected graph structure file, by which means the graph structure is determined,

- a representation component which is coupled to the editor program and with which the specific graph structure can be represented.

The invention discloses a method which is very flexible in comparison with the known methods and arrangements, and a very flexible arrangement for determining a graphic structure which can be adapted to new application scenarios in a quick and uncomplicated way, and can be adapted more satisfactorily to existing application scenarios.

In this way, different types of structures which can be represented as a graph can be processed flexibly, cost-effectively and easily with a method or with an arrangement.

Preferred developments of the invention emerge from the dependent claims.

The technical system is preferably an electronic circuit or a piece of technical equipment.

The elements are preferably graph elements of a graph which describe the technical system.

In a further refinement there is provision for the graphic structure of the technical system which is determined to be checked for predefined structure rules. In this way, it is possible to check a structure of the technical system determined by a user for predefined structure rules, which ensures that the structure rules for the respective technical system are complied with in terms of its graphic structure.

Such a structure rule is, for example, in a Petri net, the fact that a place must always follow a transition, and vice versa. If this is not the case, within the scope of this development the disclosure is made during checking of the graphic structure of a Petri net that the corresponding structure rule is infringed.

An exemplary embodiment of the invention is illustrated in the figures and explained in more detail below. In said figures:

Figure 1 shows an outline of an arrangement according to a first exemplary embodiment;

Figure 2 shows an outline of a representation component with a graphic structure with elements of a Petri net;

Figure 3 shows an outline of a representation component with a graphic structure with elements which describe an electronic circuit;

Figure 4 shows a flowchart in which the method steps of the method according to an exemplary embodiment are represented;

Figure 5 shows a set of a plurality of arrangements which, according to a second exemplary embodiment, are coupled to one another by means of a communications network.

Fig. 1 shows an arrangement 100 with a set 101 of a plurality of different graphic structure files 102, 103, 104, 105. Each graphic structure file 102, 103, 104, 105 is embodied as a file which can be linked dynamically (dynamic link library).

A user 106 selects a graphic structure file 102, 103, 104, 105 using a selection component 108 (keyboard and/or computer mouse) which is connected to an editor program 107.

The selected graphic structure file, in this exemplary embodiment a first graphic structure file 103, is dynamically integrated into the editor program 107.

After integration into the editor program 107, a set 111 of selectable elements 112, 113, 114, which are defined in the first graphic structure file 103 as selectable elements for determining a further described graph is displayed to the user 106 on a screen 110 by means of a representation component 109 which is connected to the editor program 107. In addition, in this exemplary embodiment, according to the first graphic structure file 103 a first check program 115 and a second check program 116 are integrated into the editor program 107 and made available to the user 106 for selection.

Each graphic structure file 102, 103, 104, 105 has, in each case, a set of selectable elements for the respective type of graphs, in each case a graphic structure file being

provided for one type of graph. In addition, each graphic structure file 102, 103, 104, 105 may respectively contain a specific check program which is integrated into the respective graphic structure file 102, 103, 104, 105.

After the first graphic structure file 103 has been integrated, elements of the graph are selected by the user 106 and connected to one another so that a graph is determined which is stored in the form of a predefined intermediate language 117 in a memory 118.

In addition, it is symbolically represented in Fig. 1 that the user 106 stores a plurality of structures 119, 120, 121, 122, 123 for describing different graphs, said structures relating to the type of graph predefined by the first graphic file 103.

The first graphic structure file 103 makes available elements which make possible a graph in the form of a Petri net 201 (see Fig. 2).

Fig. 2 shows the representation component 200 which is presented to the user 106 in the form of a screen surface.

The screen surface 200 has a menu list 202 with different selectable options ("File", "Edit", "Object", "View", "Tools", "Settings", "Help").

Menu items are made available to the user by means of individual selectable elements using an immediate access bar 203 by making a single, direct selection of an element.

In addition, a processing bar 204 is represented with selectable options for determining the graph. Thus, in the first graphic structure file 103, a first selection element 205 is provided with which it is possible to select and process objects represented on the screen.

The selection and processing of specific elements for a Petri net 201 is made available to the user 106 by means of a set 206 of further selector elements which will be explained in more detail below.

A second selector element 207 is described by means of an empty rectangle and symbolizes a time-specific transition.

A third selector element 208 symbolizes a timeless transition, which is represented as a selected transition element 220, 221 and 222 in the Petri net 201.

A fourth selector element 209 symbolizes an edge which is a directed edge in this exemplary embodiment.

A fifth selector element 210 symbolizes a forbidden edge which is designated in accordance with the structure rules of a Petri net 201.

A sixth selector element 211 symbolizes a place, in each case a place element 223, 224, 225, 226 being represented in the Petri net 201. The place elements 223, 224, 225 and 226 are connected to the transition elements 220, 221, 222 via edges 227, 228, 229, 230, 231 and 232.

A seventh selector element 212 symbolizes the possibility of combining a plurality of elements of the Petri net to form a composite element.

An eighth selector element 213 symbolizes an input of the Petri net 201 and a ninth selector element 214 symbolizes an output of a Petri net 201.

The edges and the individual nodes, that is to say the elements of the Petri net 201, are assigned textual information 251, 252, 253, 254, 255, 256, 257, 258, 259, 260 and 261.

In this way it is possible to assign an additional textual description to the individual elements.

If a second graphic structure file 104 is integrated into the editor program 107, the second graphic structure file 104 making available elements of an electronic circuit, and thus a graph of an electronic circuit, a screen mask represented in Fig. 3 with a set of selector elements set up for the circuit simulation is produced.

The same designations are used in Fig. 3 for the same elements displayed on the screen as represented in Fig. 2.

A set 301 of selector elements which are specifically for describing a graph of an electronic circuit contain

- a tenth selector element 302 which symbolizes an electronic resistor,
- an eleventh selector element 303 which symbolizes an electronic capacitor,
- a twelfth selector element 304 which symbolizes an inductor,
- a thirteenth selector element 305 symbolizing a transistor,
- a fourteenth selector element 306 symbolizing an operational amplifier,
- a fifteenth selector element 307 symbolizing a non-directed edge, and
- a sixteenth selector element 308 symbolizing a power source.

An electronic circuit 110 is determined by the user 106 and has, in this exemplary embodiment, a power source 311, electronic resistors 312, 313, electronic capacitors 314 and 315 and an operational amplifier 316

which are each connected to one another by means of edges 317. In addition, a ground terminal 318 is illustrated in Fig. 3. The individual circuit elements are assigned textual information 319, 320, 321, 322, 323, 324, 325, 326 for further explaining the electronic circuit 310.

Fig. 4 shows the method in its method steps in order to clarify the method.

In a first step (step 401) a graphic structure file 102, 103, 104, 105 is selected from a set 101 of graphic structure files 102, 103, 104, 105.

In a second step (step 402), a selection is made of elements which are available in accordance with the graphic structure file 102, 103, 104, 105 which was selected in the previous step (step 401).

The selected elements are illustrated by the editor program 107 in a further step (step 403).

Fig. 5 shows a first computer 500 with a memory 502 and a processor 503 which are each connected to one another by means of a bus 504 and to an input/output interface 501.

The first computer 500 is connected to a screen 505, a keyboard 506 and a computer mouse 507 by means of the input/output interface 501.

In addition, the first computer 500 is connected to further computers 510, 520, 530, 540 and 550 via a communications network 560, in the exemplary embodiment an ISDN network (Integrated Services Digital Network).

The set 101 of graphic structure files 102, 103, 104, 105 is stored in the first computer 500.

The further computers 510, 520, 530, 540 and 550 each also have a processor 513, 523, 533, 543 and 553 and each have a memory 512, 522, 532, 542 and 552. In each case the processor 513, 523, 533, 543 and 553 and the memory 512, 522, 532, 542 and 552 are connected to the communications network via, in each case, a bus 514, 524, 534, 544 and 554 via an input/output interface 511, 521, 531, 541 and 551. In addition, the further computers 510, 520, 530, 540 and 550 are each connected to a screen 515, 525, 535, 545 and 555, to a keyboard 516, 526, 536, 546 and 556 and to a computer mouse 517, 527, 537, 547 and 557.

An editor program 508, 518, 528, 538, 548, 558 is stored in each computer 500, 510, 520, 530, 540 and 550. A graphic structure file 102, 103, 104, 105 is selected by a user of a further computer 510, 520, 530, 540 and 550, and requested from the first computer 500 with a request message 570. The first computer 500 transmits the selected graphic structure file 102, 103, 104, 105 in a reply message 580 to the further computer 510, 520, 530, 540 and 550 requesting the graphic structure file 102, 103, 104, 105.

The requesting further computer 510, 520, 530, 540 and 550 has thus received the requested graphic structure file 102, 103, 104, 105, and it integrates it into its editor program 518, 528, 538, 548, 558, as described in the first exemplary embodiment.

A number of alternatives to the exemplary embodiments described above are illustrated below:

The type of elements which are made available by a graphic structure file is generally freely selectable and

depends only on the respective type of graph to be determined.

The technical system can, for example, also be a piece of technical equipment whose characteristics or structure can be described by the graph.

The editor program and the graph illustrated with the editor program can be used as part of a simulation of the technical system.

The following publications are cited in this document:

[1] Publication available on the Internet on September 2, 1998 at the address:
http://www.redac.co.uk/prod_info/brochures/14a.html

[2] G. Chiola, G. Franceschinis, R. Gaeta and M. Ribaudo, GreatSPN 1.7: Graphical Editor and Analyzer for Timed and Stochastic Petri Nets, Performance Evaluation, special issue on Performance Modeling Tools, 24 (1&2), pp. 47 - 68, November 1995

[3] G. Schmidt, Grundlagen der Regelungstechnik: Analyse und Entwurf linearer und einfacher nichtlinearer Regelungen sowie diskreter Steuerungen [Principles of control technology: analysis and design of linear and simple nonlinear closed-loop controls and discrete open-loop controls], second edition, Springer-Verlag [Publishing House], ISBN 3-540-17112-6, Berlin, pp. 320 - 328, 1991

A way of implementing the exemplary described above is given below, written in the programming language C, the implementation being divided into three files:

1. Initialization file:

```
package interfaces;

import java.io.*;
import java.util.*;
import java.awt.*;

import etc.*;
import elements.*;
import mmi.*;
import tools.*;

public class Initialisierung {
  GraphEditor editor;
  // Der hat die Tokens aus der
Datei
  StreamTokenizer token;
  // Hier kommen alle erlaubten
Knoten und Kanten aus der
  // .lgc Datei rein.
  // Die Eintrage werden mit den
Namen der Objekte referenziert
  Hashtable gobjekte;
  // Die aktuelle .lgc Datei
  //String configFile;
  // steht jetzt bei den Einstel-
lungen
  /**
   * Hier stehen alle Attribute
drin.
   */
  Hashtable attributNamen;
  /**
   * hier kommen die Eintrage fur
das Menue Tools
   * hinein.
   */
  Hashtable tools;

  public Initialisie-
rung(GraphEditor editor) {
    this.editor = editor;
    gobjekte = new Hashtable();
    attributNamen = new Has-
htable();
    tools = new Hashtable();
  }


  /**
   * Diese Methode würde die er-
ste Initialisierungsdatei
   * einlesen für die Einstellu-
gen der Farben, Schriften...
   * Aber ich darf leider nicht.
   */
 /*
  public void readFirst(String
name) {
    String configFile = new
String(name);
    int c;
    //Properties properties = new
Properties();
    //properties = Sy-
stem.getProperties();
    //filename = new String(".."
+ proper-
ties.getProperty("file.separator"
) + configfile);
    try {
      File file = new
File(configFile);
      //FileInputStream in = new
FileInputStream(file);
      FileReader in = new File-
Reader(file);
      token = new StreamTokeni-
zer(in);

      //Einstellen der Optionen
fur token
      to-
ken.eolIsSignificant(true);
      token.quoteChar('"');
      //token.quoteChar('\'');
      //token.quoteChar('{');
      token.quoteChar('}');

      //Überlese { und , und ;
      to-
ken.whitespaceChars('{','{');
      to-
ken.whitespaceChars(',',',');
      to-
ken.whitespaceChars(';',';');


      boolean fertig = false;
        while (!fertig) {
          switch
(c=token.nextToken()){
```

```
            case StreamTokeni-
zer.TT_EOF:
                fertig= true;
                break;
              case StreamTokeni-
zer.TT_WORD:
                if
(token.sval.equals("DATAPATH")) {

c=token.nextToken();
                  if (c == '"') {
                    Sy-
stem.out.println("DATAPATH " +
token.sval);
                  }
                   break;
                }
                if
(token.sval.equals("DATAFILTER"))
{

c=token.nextToken();
                  if (c == '"') {
                    Sy-
stem.out.println("DATAFILTER " +
token.sval);
                  }
                    break;
                  }
                  if
(token.sval.equals("FILELIST")) {
                   while (c != '}')
{

c=token.nextToken();
                       if (c ==
'"') {
                     edi-
tor.getMenueleiste().addFileToMen
u(token.sval);
                       }
                   }
                   break;
                }
                if
(token.sval.equals("COLORS")) {
                   while (c != '}')
{

c=token.nextToken();
                     if (c == Stre-
amTokenizer.TT_WORD) {
                       String aus-
wahl = token.sval;

c=token.nextToken();

//System.out.print("Wert1 " + to-
ken.nval);
                     int r =
(int)token.nval;

c=token.nextToken();

//System.out.print("Wert2 " + to-
ken.nval);
                     int g =
(int)token.nval;

c=token.nextToken();

//System.out.println("Wert3 " +
token.nval);
                     int b =
(int)token.nval;

//System.out.flush();
                     ueberge-
be(auswahl,r,g,b);
                   }
                  }
                  break;
                }
                if
(token.sval.equals("FONTS")) {
                  while (c != ')')
{

c=token.nextToken();
                    if (c == Stre-
amTokenizer.TT_WORD) {
                      String aus-
wahl = token.sval;

//System.out.print("FONT " + to-
ken.sval);

c=token.nextToken();
                      String font-
name = token.sval;

//System.out.print(" NAME " + to-
ken.sval);

c=token.nextToken();
                      String style
= token.sval;

//System.out.print(" STYLE " +
token.sval);

c=token.nextToken();
                      int size
=(int) token.nval;
                      ueberge-
be(auswahl,fontname,style,size);

//System.out.println(" SIZE " +
token.nval);
                    }
                   }
                 break;
                 }
```

```
                if
(token.sval.equals("SHORTCUTS"))
{
                  while (c != '}')
{

c=token.nextToken();
                    if (c == '"')
{
                      String
mpunkt = token.sval;

//System.out.print("MENUPUNKT " +
token.sval);

c=token.nextToken();
                      String icon1
= token.sval;

//System.out.print("ICON1 " + to-
ken.sval);

c=token.nextToken();
                      String icon2
= token.sval;

//System.out.println("ICON2 " +
token.sval);
                      edi-
tor.getShortcutleiste().addShortB
utton();
                    }
                  }
                   break;
                }
               if
(token.sval.equals("ACCELERATOR")
) {
                 while (c != '}')
{

c=token.nextToken();
                   if (c == '"') {
                     String la-
bel = token.sval;

//System.out.print("MENUPUNKT " +
token.sval);

c=token.nextToken();
                     if (c ==
StreamTokenizer.TT_WORD) {
                     char cut =
token.sval.charAt(0);

//System.out.println(" TASTEN " +
cut);
                     edi-
tor.getMenueleiste().addShortcutT
oVector(label, cut);
                   }
                 }
                 }
                 break;
               }
               if
(token.sval.equals("WINDOWSIZE"))
{

c=token.nextToken();
                     int x
=(int)token.nval;

c=token.nextToken();

c=token.nextToken();
                     int y
=(int)token.nval;

//size.setSize(x,y);
                     break;
               }
               if
(token.sval.equals("WINDOWPOSITIO
N")) {

c=token.nextToken();
                    int x
=(int)token.nval;

c=token.nextToken();

c=token.nextToken();
                     int y
=(int)token.nval;

//location.setSize(x,y);
                    break;
               }
                 if
(token.sval.equals("AUTHOR")) {

c=token.nextToken();
                 if (c == '"') {
                     Sy-
stem.out.println("AUTHOR " + to-
ken.sval);
                   }
                  break;
                }
               if
(token.sval.equals("TOOLS")) {
                 while (c != '}')
{

c=token.nextToken();
                   if (c == '"')
{
                     String pfad
=new String(token.sval);

//System.out.println("TOOL " +
token.sval);
```

```
c=token.nextToken();
                    String fi-
leName =new String(token.sval);

//System.out.println("TOOL " +
token.sval);

c=token.nextToken();
                   String text
=new String(token.sval);

//System.out.println("TOOL " +
token.sval);
                    edi-
tor.getMenueleiste().addToolToVec
tor(pfad,fileName,text);
                  }
                  }
                 break;
               } else
                 break;

             default:
           }
         }

    in.close();
    System.out.flush();
    System.out.println("EINLESEN
DER DATEI " +configFile + "
FERTIG'");

    } catch
(FileNotFoundException e) {
       System.err.println( con-
figFile + " is not found");
    } catch (IOException e) {
      e.printStackTrace();
    }
  }//read first
  */


  /**
   * Diese Methode liest eine
Toolbar ein.
   * Sie benötigt den Pfad zur
Datei und den Dateinamen.
   */
  public void readSecond(String
lgcPath, String datei) {
    String configFile = new
String(lgcPath + datei);
    int c;
    try {
      File file = new
File(configFile);
      FileReader in = new File-
Reader(file);
      token = new StreamTokeni-
zer(in);
      //Einstellen der Optionen
für token
      to-
ken.eolIsSignificant(false);
      token.quoteChar('"');
      //token.quoteChar('\'');
      //token.quoteChar('{');
      token.quoteChar('}');

      //Überlese ( und , und ;
      to-
ken.whitespaceChars('(','(');
      to-
ken.whitespaceChars(',',',');
      to-
ken.whitespaceChars(';',';');



      boolean fertig = false;
        while (!fertig) {
          switch
(c=token.nextToken()){
            case StreamTokeni-
zer.TT_EOF:
              fertig= true;
              break;
            case StreamTokeni-
zer.TT_WORD:
              if
(token.sval.equals("TOOLBAR")) {
                Sy-
stem.out.println("Lese Toolbar");
                readTool-
bar(lgcPath);
                break;
              }
              if
(token.sval.equals("MENU")) {
                Sy-
stem.out.println("Lese Menue");
                readMenu();
                break;
              }
              if
(token.sval.equals("ANALYSISBAR")
) {
                Sy-
stem.out.println("Lese Analyse-
Bar");
                readAnalyse();
                break;
              }
              if
(token.sval.equals("SHORTCUTS"))
{
                Sy-
stem.out.println("Lese Short-
cuts");
                readShorts();
                break;
```

```
                }
                if
(token.sval.equals("ACCELERATOR")
) {
                  Sy-
stem.out.println("Lese Accelera-
tor");
                  readAccel();
                  break;
                }
                default:
              }
            }

    in.close();
    System.out.flush();
    System.out.println("EINLESEN
DER DATEI " +configFile + "
FERTIG!");
    //und wichtig für die Anzei-
ge:
    setLayer();
    setAttributNames();
    } catch
(FileNotFoundException e) {
       System.err.println( con-
figFile + " is not found");
    } catch (IOException e) {
       e.printStackTrace();
    }
  }

  private void readToolbar(String
lgcPath) {
    int c ='{';
    gobjekte.clear();
    //System.out.println("Jetzt
kommt die Toolbar");
    try {
      while (c != '}') {
        switch
(c=token.nextToken()){
          case StreamTokeni-
zer.TT_WORD:
            if
(token.sval.equals("NODE")) {

//System.out.println("Lese Kno-
ten");
              readNode(lgcPath);
              break;
            }
            if
(token.sval.equals("EDGE")) {

//System.out.println("Lese Kan-
te");
              readEdge(lgcPath);
              break;
            }
          default:
        }
        //c=token.nextToken();
        //System.out.println("IN
der TOOLBAR " +c );
      }
    } catch (IOException e) {
      e.printStackTrace();
    }
    //System.out.println("Fertig
Toolbar");
  }


  private void readNode(String
lgcPath) {
    int c ='{';
    String typname = new
String();
    String image = new String();
    Vector ecken = new Vector();
    Vector konnektoren = new Vec-
tor();
    Vector konnektorNamen = new
Vector();
    Attribute attribute = new
StandardAttribute();
    Color color = new Co-
lor(255,255,255);
    //System.out.println("Ein
Knoten");
    try {
      while (c != '}') {
        switch (c){
          case StreamTokeni-
zer.TT_WORD:
            // Wird nicht mehr be-
notigt
            // if
(token.sval.equals("TYPE")) {
            //
c=token.nextToken();
            //   Sy-
stem.out.println("Lese TYPE" +
token.sval);
            //   break;
            // }
             if
(token.sval.equals("NAME")) {

c=token.nextToken();
              typname = new
String(token.sval);
              // Sy-
stem.out.println("Lese NAME" +
typname);
              break;
             }
             if
(token.sval.equals("ATTRIBUTES"))
{
              attribute = new
StandardAttribute();
```

```
                while
((c=token.nextToken()) != '}') {
                    String aname =
new String(token.sval);
                    c = to-
ken.nextToken();
                    String wert = new
String(token.sval);
                    attribu-
te.addAttribut(aname,wert,true);
                    attributNa-
men.put(aname,aname);
                    // Sy-
stem.out.println("Lese Attribut-
te" + attribute);
                }

                break;
              }
              if
(token.sval.equals("IMAGE")) {

c=token.nextToken();
                image = new
String(token.sval);
                // Sy-
stem.out.println("Lese IMAGE" +
image);
                break;
              }
              if
(token.sval.equals("FILLEDPOLYGON
")) {
                ek-
ken.removeAllElements();
                int x,y;
                while
((c=token.nextToken()) != '}') {
                  x =
(int)token.nval;

c=token.nextToken();
                  y =
(int)token.nval;
                  ek-
ken.addElement(new Point(x,y));
                  // Sy-
stem.out.println("Lese POLYGON" +
ecken);
                }
                // jetzt sollten
alle Daten da sein, und es
                // kann ein Knoten-
prototyp erzeugt werden.
              GraphObjekt knoten =
new FilledPolygonKnoten(typname,

ecken,

konnektoren,

konnektorNamen,
```

```
attribute);
                kno-
ten.setColor(color);
                // Sy-
stem.out.println("Setze Farbe " +
color);
                // Erzeuge Button
mit Werzeug für Werkzeugleiste
                ToolButton b = new
ToolButton(lgcPath + "images/" +
image,

typname,

new KnotenTool(editor,typname),

editor.getToolbar());
                edi-
tor.getToolbar().addToolButton(b)
;
                // Eintrag in die
Hashtabelle
                gobjek-
te.put(typname,knoten);
                // Sy-
stem.out.println("In Hashtabelle:
" + gobjekte);

                break;
              }
              if
(token.sval.equals("POLYGON")) {
                ek-
ken.removeAllElements();
                int x,y;
                while
((c=token.nextToken()) != '}') {
                  x =
(int)token.nval;

c=token.nextToken();
                  y =
(int)token.nval;
                  ek-
ken.addElement(new Point(x,y));
                  // Sy-
stem.out.println("Lese POLYGON" +
ecken);
                }
                // jetzt sollten
alle Daten da sein, und es
                // kann ein Knoten-
prototyp erzeugt werden.
              GraphObjekt knoten =
new PolygonKnoten(typname,

ecken,

konnektoren,

konnektorNamen,
```

```
attribute);
                kno-
ten.setColor(color);
                // Sy-
stem.out.println("Setze Farbe " +
color);
                // Erzeuge Button
mit Werzeug für Werkzeugleiste
                // Der Button greift
über den typnamen auf den richti-
gen
                // Knoten zu.
                ToolButton b = new
ToolButton(lgcPath + "images/" +
image,

typname,

new KnotenTool(editor,typname),

editor.getToolbar());
                edi-
tor.getToolbar().addToolButton(b)
;
                // Eintrag in die
Hashtabelle
                gobjek-
te.put(typname,knoten);

//System.out.println("In Hashta-
belle: " + gobjekte);

                 break;
               }
               if
(token.sval.equals("FILLEDOVAL"))
{
                 int breite=10;
                 int hoehe=10;
                 while
((c=token.nextToken()) != '}') {
                   breite =
(int)token.nval;

c=token.nextToken();
                   hoehe =
(int)token.nval;
                 // Sy-
stem.out.println("Lese OVAL_FILL"
+ token.nval);
                }
                // jetzt sollten
alle Daten da sein, und es
                // kann ein Knoten-
prototyp erzeugt werden.
                GraphObjekt knoten
= new FilledOvalKnoten(typname,

hoehe,

breite,
```

```
konnektoren,

konnektorNamen,

attribute);
                kno-
ten.setColor(color);
                // Sy-
stem.out.println("Setze Farbe " +
color);
                // Erzeuge Button
mit Werzeug für Werkzeugleiste
                ToolButton b = new
ToolButton(lgcPath + "images/" +
image,

typname,

new KnotenTool(editor,typname),

editor.getToolbar());
                edi-
tor.getToolbar().addToolButton(b)
;
               // Eintrag in die
Hashtabelle
               gobjek-
te.put(typname,knoten);

//System.out.println("In Hashta-
belle: " + gobjekte);

                 break;
               }
               if
(token.sval.equals("OVAL")) {
                 int breite=10;
                 int hoehe=10;
                 while
((c=token.nextToken()) != '}') {
                   breite =
(int)token.nval;

c=token.nextToken();
                   hoehe =
(int)token.nval;
                 // Sy-
stem.out.println("Lese OVAL" +
token.nval);
                }
                // jetzt sollten
alle Daten da sein, und es
                // kann ein Knoten-
prototyp erzeugt werden.
                GraphObjekt knoten
= new OvalKnoten( typname,

hoehe,

breite,
```

```
konnektoren,

konnektorNamen,

attribute);
                knoten.setColor(color);
                // System.out.println("Setze Farbe " + color);
                // Erzeuge Button mit Werzeug für Werkzeugleiste
                ToolButton b = new ToolButton(lgcPath + "images/" + image,

typname,

new KnotenTool(editor,typname),

editor.getToolbar());
              editor.getToolbar().addToolButton(b);
              // Eintrag in die Hashtabelle
              gobjekte.put(typname,knoten);

//System.out.println("In Hashtabelle: " + gobjekte);

              break;
            }
            if (token.sval.equals("CONNECTORS")) {
              konnektoren.removeAllElements();
              int x,y;
              String name;
              while ((c=token.nextToken()) != '}') {
                x = (int)token.nval;

c=token.nextToken();
                y = (int)token.nval;

c=token.nextToken();
                name = token.sval;
                konnektoren.addElement(new Point(x,y));
                konnektorNamen.addElement(name);
                // System.out.println("Lese Konnektoren" + konnektoren);
                // System.out.println("Die Namen: " + konnektorNamen);
              }
              break;
            }
            if (token.sval.equals("COLOR")) {

c=token.nextToken();

//System.out.println("Lese COLOR" + token.nval);
              int r = (int)token.nval;

c=token.nextToken();

//System.out.println("Lese COLOR" + token.nval);
              int g = (int)token.nval;

c=token.nextToken();

//System.out.println("Lese COLOR" + token.nval);
              int b = (int)token.nval;
              color = new Color(r,g,b);
              break;
            }
          default:
        }//switch
        c=token.nextToken();
        // System.out.println("NAECHSTES TOKEN" + token.sval);
      } //while
      //c=token.nextToken();
    } catch (IOException e) {
      e.printStackTrace();
    }
    // System.out.println("Bende readNode");

  }//readNode


  private void readEdge(String lgcPath) {
    // System.out.println("Eine Kante");
    int c ='{';
    String typname = new String();
    String image = new String();
    Attribute attribute = new StandardAttribute();
```

```
    Color color = new Co-
lor(255,255,255);
    try {
      while (c != '}') {
        switch (c){
          case StreamTokeni-
zer.TT_WORD:

            if
(token.sval.equals("NAME")) {

c=token.nextToken();
              typname = new
String(token.sval);
              // Sy-
stem.out.println("Lese NAME" +
typname);
              break;
            }
            if
(token.sval.equals("ATTRIBUTES"))
{
              attribute = new
StandardAttribute();
              while
((c=token.nextToken()) != '}') {
                String aname =
new String(token.sval);
                c = to-
ken.nextToken();
                String wert = new
String(token.sval);
                attribu-
te.addAttribut(aname,wert,true);
                attributNa-
men.put(aname,aname);
                // Sy-
stem.out.println("Lese Attribut-
te" + attribute);
              }

              break;
            }
            if
(token.sval.equals("IMAGE")) {

c=token.nextToken();
              image = new
String(token.sval);
              // Sy-
stem.out.println("Lese IMAGE" +
image);
              break;
            }
            if
(token.sval.equals("ARROW")) {
              int radius = 10;
              int winkel = 10;
              while
((c=token.nextToken()) != '}') {
                radius =
(int)token.nval;

c=token.nextToken();
                winkel =
(int)token.nval;
                // Sy-
stem.out.println("Lese Arrow" +
radius+ winkel);
              }
              // jetzt sollten
alle Daten da sein, und es
              // kann ein Kanten-
prototyp erzeugt werden.
              GraphObjekt kante =
new PfeilKante(typname,

radius,

winkel,

attribute);
              kan-
te.setColor(color);
              // Sy-
stem.out.println("Setze Farbe " +
color);
              // Erzeuge Button
mit Werzeug für Werkzeugleiste
              ToolButton b = new
ToolButton(lgcPath + "images/" +
image,

typname,

new KantenTool(editor,typname),

editor.getToolbar());
              edi-
tor.getToolbar().addToolButton(b)
;
              // Eintrag in die
Hashtabelle
              gobjek-
te.put(typname,kante);

//System.out.println("In Hashta-
belle: " + gobjekte);

              break;
            }
            if
(token.sval.equals("POINT")) {
              int durch = 10;
              while
((c=token.nextToken()) != '}') {
                durch =
(int)token.nval;
              // Sy-
stem.out.println("Lese Point" +
durch);
              }
              // jetzt sollten
alle Daten da sein, und es
```

```
                // kann ein Kanten-
prototyp erzeugt werden.
                GraphObjekt kante =
new KreisKante(typname,

durch,

attribute);
                kan-
te.setColor(color);
                // Sy-
stem.out.println("Setze Farbe " +
color);
                // Erzeuge Button
mit Werzeug für Werkzeugleiste
                ToolButton b = new
ToolButton(lgcPath + "images/" +
image,

typname,

new KantenTool(editor,typname),

editor.getToolbar());
                edi-
tor.getToolbar().addToolButton(b)
;
                // Eintrag in die
Hashtabelle
                gobjek-
te.put(typname,kante);

//System.out.println("In Hashta-
belle: " + gobjekte);

                break;
              }
              if
(token.sval.equals("NOEND")) {

                while
((c=token.nextToken()) != ')') {
                 // durch =
(int)token.nval;
            // Sy-
stem.out.println("Lese Point" +
durch);
                }
                // jetzt sollten
alle Daten da sein, und es
                // kann ein Kanten-
prototyp erzeugt werden.
                GraphObjekt kante =
new StandardKante(typname,

attribute);
                kan-
te.setColor(color);
                // Sy-
stem.out.println("Setze Farbe " +
color);
                // Erzeuge Button
mit Werzeug für Werkzeugleiste
                ToolButton b = new
ToolButton(lgcPath + "images/" +
image,

typname,

new KantenTool(editor,typname),

editor.getToolbar());
                edi-
tor.getToolbar().addToolButton(b)
;
                // Eintrag in die
Hashtabelle
                gobjek-
te.put(typname,kante);

//System.out.println("In Hashta-
belle: " + gobjekte);

                break;
              }
              if
(token.sval.equals("SIZE")) {

c=token.nextToken();
                 Sy-
stem.out.println("Lese SIZE" +
token.nval);
                break;
              }
              if
(token.sval.equals("COLOR")) {

//System.out.println("Lese COLOR"
+ token.nval);

c=token.nextToken();
                int r =
(int)token.nval;

c=token.nextToken();

//System.out.println("Lese COLOR"
+ token.nval);
                int g =
(int)token.nval;

c=token.nextToken();

//System.out.println("Lese COLOR"
+ token.nval);
                int b =
(int)token.nval;
                color = new Co-
lor(r,g,b);
                // Sy-
stem.out.println("Gelesene Farbe:
" + color);
```

```
            break;
          }
        default:
      }//switch
      c=token.nextToken();
      // Sy-
stem.out.println("NAECHSTES
TOKEN" + token.sval);
    } //while
    //c=token.nextToken();
  } catch (IOException e) {
    e.printStackTrace();
  }
  // System.out.println("Bende
readEdge");

}//readEdge


private void readMenu() {
  tools.clear();
  int c = '{';
  try {
    while
((c=token.nextToken()) != '}') {
      //c=token.nextToken();
      String namen = to-
ken.sval;
      System.out.println("Jetzt
kommt das Menu"+ namen);
      c = token.nextToken();
      String aufruf = to-
ken.sval;
      System.out.println("Jetzt
kommt das Menu"+ aufruf);
      tools.put(new
String(namen), new
String(aufruf));
    }
  } catch (IOException e) {
    e.printStackTrace();
  }

}

private void readAnalyse() {
  System.out.println("Jetzt
kommt die Analyse");
}

private void readShorts() {
  System.out.println("Jetzt
kommt die Shortcut");
}

private void readAccel() {
  System.out.println("Jetzt
kommen die Accelerators");
}
```

```
// private void uebergebe
(String mpunkt,String
icon1,String icon2) {
//   public void addBut-
ton(String menuePunkt, String
image1, String image2)

  private void uebergebe(String
auswahl,String name,String style,
int size) {
    int styleInt = 0;
    switch (style.charAt(0)){
      case 'B':
        styleInt = Font.BOLD;
        break;
      case 'P':
        styleInt = Font.PLAIN;
        break;
      case 'I':
        styleInt = Font.ITALIC;
        break;
      default:
        styleInt = Font.PLAIN;
    }
    Font font = new Font(name,
styleInt, size);
    switch (auswahl.charAt(0)){
      case 'M':
        edi-
tor.getMenueleiste().setFont(font
);
        break;
      case 'P':
        //noch zu Implementiern
        break;
      case 'S':
        edi-
tor.getStatusleiste().setFont(fon
t);
        break;
    }
  }

  private void uebergebe(String
auswahl,int r,int g,int b) {
    if (auswahl.equals("PAPER")){
      edi-
tor.getZeichenflaeche().setBackgr
ound(new Color(r,g,b));
    }
    if (auswahl.equals("GRID")){
      //noch zu implementiern
    }
    if
(auswahl.equals("MENUBGC")){
   // edi-
tor.getMenueleiste().setBackgroun
d(new Color(r,g,b));
    }
    if
(auswahl.equals("MENUFGC")){
```

```
    //  menubar.setForeground(new
Color(r,g,b));
    }
    if
(auswahl.equals("STATUSBGC")){
      edi-
tor.getStatusleiste().setBackgrou
nd (new Color(r,g,b));
    }
    if
(auswahl.equals("STATUSFGC")){
      edi-
tor.getStatusleiste().setForegrou
nd(new Color(r,g,b));
    }
    if
(auswahl.equals("TOOLBGC")){
      edi-
tor.getToolbar().setBackground(ne
w Color(r,g,b));
    }
    if
(auswahl.equals("TOOLFGC")){
      edi-
tor.getToolbar().setForeground
(new Color(r,g,b));
    }
    if
(auswahl.equals("SHORTCUTBGC")){
      edi-
tor.getShortcutleiste().setBackgr
ound(new Color(r,g,b));
    }
    if
(auswahl.equals("SHORTCUTFGC")){
      edi-
tor.getShortcutleiste().setForegr
ound (new Color(r,g,b));
    }
  }

  /**
   * Liefert eine Kopie eines
GraphObjektes
   * zuruck.
   */
  public GraphObjekt getOb-
jekt(String name) {
    if
(gobjekte.containsKey(name)) {
      GraphObjekt vater =
(GraphObjekt)gobjekte.get(name);
      return
(GraphObjekt)vater.copy();
    } else {
      return null;
    }
  }

  /**
   * Diese Methode fügt alle an-
zeigbaren ObjekteTypen in die
   * Hashtable der Klasse Gra-
phObjekt ein,
   * -> alle Objekte werden ange-
zeigt.
   */
  public void setLayer() {
    Hashtable alle = new Has-
htable(gobjekte.size(),1.0f);
    Enumeration e = gobjek-
te.keys();
    while (e.hasMoreElements())
{
      String key =
(String)e.nextElement();
      alle.put(key,new
String(key));
    }
    GraphObjekt.toShow = alle;
  }

  /**
   * Liefert alle anzeigbaren
Layers zurück.
   */
  public Enumeration getLayers()
{
    return gobjekte.keys();
  }

  /**
   * Liefert die maximale Anzahl
der Layers zurück.
   */
  public int countLayers() {
    return gobjekte.size();
  }

  /**
   * Diese Methode fügt alle an-
zeigbaren AttributNamenn in die
   * Hashtable der Klasse Attri-
bute ein,
   * -> alle Attribute werden an-
gezeigt.
   */
  public void setAttributNames()
{
    Hashtable alle = new Has-
htable(attributNamen.size(),1.0f)
;
    Enumeration e = attributNa-
men.keys();
    while (e.hasMoreElements())
{
      String key =
(String)e.nextElement();
      alle.put(key,new
String(key));
    }
    Attribute.toShow = alle;
  }
```

```
   /**
    * Liefert alle anzeigbaren
AttributNamen zuruck.
    */
   public Enumeration getAttri-
butNames() {
     return attributNamen.keys();
   }

   /**
    * Liefert die maximale Anzahl
der Attribute zuruck.
    */
   public int countAttributNa-
mes() {
     return attributNamen.size();
   }

   /**
    * Fügt einen Attribut namen
in die
    * Hashtabel ein.
    */
   public void addAttributName (
String name) {
     attributNamen.put(new
String(name), new String(name));
   }

   /**
    *
    */
   public Hashtable getTools() {
     return tools;
   }

 // public String getConfigFile()
{
  //  return configFile;
 // }
}
```

2."load" file

```
package commands;

import etc.*;
import java.util.*;
import java.awt.*;
import java.io.*;
import interfaces.*;

/**
 * Ladt einen Graphen aus einer
.lgf Datei.
 */
public class Load extends Befehl
{
  Vector undo;

  public Load(GraphEditor edi-
tor){
    super(editor);
    undo=new Vector();
    help =
"<filename.lgf/.lgc/.lgt>";
  }


  public void ausfuehren(String[]
param){
    //System.out.println(param);
    int anzahl = param.length;
    switch (anzahl) {
      case 0  : // bei keinem Ar-
gument tun wir nichts.
                break;
      case 1  : // bei einen Ar-
gument wird erst nachgeschaut!
                if
(param[0].endsWith(".lgc") ||
                    pa-
ram[0].endsWith(".lgf") ||
                    pa-
ram[0].endsWith(".lgt") ) {
                  // wir wurden
von der CommandoZeile aufgerufen
                    File file = new
File(param[0]);

//System.out.println("Der Pfad :
" + file.getParent());

//System.out.println("Der Name :
" + file.getName());
                    prue-
fe(file.getParent()+"/",file.getN
ame());
                } else {
                  //nothing
                }
                break;
      default : //zuviel Parame-
ter
                break;
    }//switch
  }

  public void ausfuehren(String
param){
    edi-
tor.getStatusleiste().show("Load.
..");

((Component)editor).setCursor(Cur
```

```
sor.getPredefinedCursor(Cursor.WA
IT_CURSOR));
    FileDialog fd = new FileDia-
log((Frame)editor,null,FileDialog
.LOAD);
    // das hat leider noch keine
Auswirkungen in Windows und Sola-
ris
    // ab 1.1.6 gehts doch

fd.setDirectory(System.getPropert
y("user.dir"));
    // das schon
    fd.setFile("noname.lgf");
    FilenameFilter filter = new
lgFilter();
    fd.setFilenameFilter(filter);
    fd.show();
    String dir =
fd.getDirectory();
    String file = fd.getFile();
    // fd.getFile() liefert null
bei Abbruch!
    if (file == null) {
      // nichts zu tun

((Component)editor).setCursor(Cur
sor.getDefaultCursor());
      return;
    } else {
      // laden

//System.out.println(fd.getDirect
ory());

//System.out.println(fd.getFile()
);
      Vector ge-
loescht=editor.getGraph().removeA
ll();
      pruefe(dir,file);
      edi-
tor.getGraph().setChanged(false);
      editor.setAuswahl(new Vec-
tor());
      Vector lastCommands = edi-
tor.getLastCommands();
      if (lastCommands.size() <
10) {
        lastCom-
mands.addElement(this);
      } else {
        lastCom-
mands.removeElementAt(0);
        lastCom-
mands.addElement(this);
      }
      if (undo.size() < 10) {

undo.addElement(geloescht);
      } else {
        undo.removeElementAt(0);

undo.addElement(geloescht);
      }
    }//else
    edi-
tor.getZeichenflaeche().drawBuffe
r(editor.getGraph());

((Component)editor).setCursor(Cur
sor.getDefaultCursor());
    edi-
tor.getStatusleiste().show("Done"
);
  }
  /**
   * Macht Datei laden rückgan-
gig.
   */
  public void undo() {
    edi-
tor.getStatusleiste().show("Undo:
Load...");

((Component)editor).setCursor(Cur
sor.getPredefinedCursor(Cursor.WA
IT_CURSOR));
    if (!undo.isEmpty()) {
      Vector insert =
(Vector)undo.lastElement();
      if (insert != null) {
        edi-
tor.getGraph().removeAll();
        edi-
tor.getGraph().add(insert);

insert.removeAllElements();
      }

undo.removeElement(undo.lastEleme
nt());
    }
    edi-
tor.getZeichenflaeche().drawBuffe
r(editor.getGraph());
    edi-
tor.getGraph().setChanged(true);
    edi-
tor.getStatusleiste().show("Done"
);

((Component)editor).setCursor(Cur
sor.getDefaultCursor());
  }//undo

  /**
   * Wiederholt Datei laden..
   */
  public void redo() {
    edi-
tor.getStatusleiste().show("Redo:
Load...");
    ausfuehren();
```

```
  }// redo

  /**
   * Diese Klasse wird leider
nicht an
   * die Windows bzw Solaris Kom-
ponente
   * weitergereicht.
   */
  class lgFilter implements Fi-
lenameFilter {
    public boolean accept (File
dir, String name) {
      return ( na-
me.endsWith(".lgf") ||
               na-
me.endsWith(".lgc") ||
               na-
me.endsWith(".lgt")  );
    }
  }
  /**
   * Diese Methode überpruft, ob
die richtige
   * Konfigurationsdatei geladen
ist, ansonsten wird
   * versucht die richtige zu la-
den.(->Editor zurücksetzen)
   * Dannach wird die gewunschte
.lgt oder .lgf Datei
   * geladen.
   */
  private void pruefe (String
pfad, String datei) {
    Einstellungen settings= edi-
tor.getEinstellungen();
   if (datei.endsWith(".lgc")) {
     //System.out.println("eine
lgc Datei");
      File f = new File(pfad +
datei);
      if (f.exists()) {
        settings.appName = Ein-
stellungen.format(datei);
        settings.fileName=" ";
        settings.frameName = set-
tings.fileName+ "  "
+settings.appName + "  "
+settings.copyright;
        settings.configFile = new
String(datei);
        settings.lgcPath = new
String(pfad);
        //wir Starten den Editor
neu
        editor.start();
      } else {
        System.err.println("File
not found : "+ settings.lgcPath +
datei);
      }
    } else if
(datei.endsWith(".lgf")) {
      //System.out.println("eine
lgf Datei");
      File f = new File(pfad +
datei);
      if (f.exists()) {
        settings.fileName = da-
tei;
        // wir holen uns noch den
namen des .lgc Files:
        String config = edi-
tor.getDateischnittstelle().getCo
nfig(pfad + datei);
        //System.out.println("Der
neue Name der Lgc datei " + con-
fig);
        f = new
File(settings.lgcPath + config);
        if (f.exists()) {
          // ist diese lgc Datei
schon geladen?
          if
(settings.configFile.equals(confi
g)) {
            //wir muessen nur die
lgf Datei laden
            edi-
tor.getDateischnittstelle().load(
pfad,datei,editor.getGraph());
            settings.frameName =
settings.fileName+ "  "
+settings.appName + "  "
+settings.copyright;
            ((Frame)editor). set-
Title(settings.frameName);
          } else {
            // wir mussen auch
die Konnfigurationsdatei laden
            settings.appName =
Einstellungen.format(config);
            settings.configFile =
new String(config);
            settings.frameName =
settings.fileName+ "  "
+settings.appName + "  "
+settings.copyright;
            //wir Starten den
Editor neu
            editor.start();
            edi-
tor.getDateischnittstelle().load(
pfad,datei,editor.getGraph());
          }
        } else {
          Sy-
stem.err.println("File not found
: " + settings.lgcPath + config);
        }
      } else {
        System.err.println("File
not found : " + pfad + datei);
```

```
      }
      //start();
    } else if
(datei.endsWith(".lgt")) {
      //System.out.println("eine
lgt Datei");
      File f = new File(pfad +
datei);
      if (f.exists()) {
        settings.fileName = da-
tei;
       settings.frameName = set-
tings.fileName+ "  "
+settings.appName + "  "
+settings.copyright;
       // wir holen uns noch den
namen des .lgc Files:
       //String config = edi-
tor.getDateischnittstelle().getCo
nfig(pfad + datei);
       //System.out.println("Der
neue Name der Lgc datei " + con-
fig);
       //f = new
File(settings.lgcPath + config);
       //if (f.exists()) {
         // ist diese lgc Datei
schon geladen?
          //if
(settings.configFile.equals(confi
g)) {
            //wir muessen nur die
lgt Datei laden und interpretie-
ren
            LgtInterpreter inter-
preter=editor.getInterpreter();

//System.out.println("Der Inter-
preter : " + interpreter);
            if (interpreter ==
null) {
              interpreter = new
LgtInterpreter(editor,pfad + da-
tei);
              edi-
tor.setInterpreter(interpreter);
              interpre-
ter.start();
            } else {
              interpre-
ter.setFile(pfad + datei);
            }

//Dateischnittstelle().load(pfad,
datei,editor.getGraph());
            //settings.frameName
= settings.appName + "  " + set-
tings.fileName;
            //((Frame)editor).
setTitle(settings.frameName);
          // } else {
            // wir mussen auch
die Konnfigurationsdatei laden
           // settings.appName =
Einstellungen.format(config);
            //settings.configFile
= new String(config);
            //settings.frameName
= settings.appName + "  " + set-
tings.fileName;
            //wir Starten den
Editor neu
            //editor.start();
           // LgtInterpreter in-
terpreter = new LgtInterpre-
ter(editor,pfad + datei);
            // edi-
tor.setInterpreter(interpreter);
          //  interpre-
ter.start();
         // }
        //} else {
       //   Sy-
stem.err.println("File not found
: " + settings.lgcPath + config);
          //}
      } else {
        System.err.println("File
not found : " + pfad + datei);
      }
    } else {
      System.err.println("usage:
java LoGraph2 <path to config-
files> AND <file.lgc> OR
<file.lgf> OR <file.lgt>");
    }
  }

}
```

3. "toolbar" file

```
package mmi;

import java.awt.*;
import java.awt.event.*;

import etc.*;
import tools.*;

/**
 * Über das aktuelle Tool der
Toolbar werden die
 * Maus Aktionen des Benutzers an
den Graphen weitergegeben.
```

```
 * Die Toolbar ermoglicht das
hinzufügen und entfernen
 * von ToolButtons, und deren zu-
gehorigen ActionListener.
 */
public class Toolbar extends Pa-
nel {
  GraphEditor editor;
  Tool currentTool;
  ToolButton currentButton;
  int borderSize = 4;
  /**
   * Der Konstruktor erzeugt das
AuswahlTool,
   * da dieses immer vorhanden
sein sollte.
   */
  public Toolbar(GraphEditor edi-
tor){
    this.editor = editor;
    setLayout(new BarLay-
out(BarLayout.VERTIKAL,2));
    setBackgro-
und(editor.getEinstellungen().too
lbarBgCo);
    // eine kleine Lucke
    add(new Space(5,24));

    ToolButton b = new ToolBut-
ton(editor.getEinstellungen().lgc
Path +

"images/auswahl.gif",

"Select",

new AuswahlTool(editor),this);
    setCurrentTool(b.getTool());
    setCurrentButton(b);
    add(b);
    add(new Space(5,24));
  }


  public Insets getInsets() {
    Insets insets =
(Insets)(super.getInsets()).clone
();
    insets.top += borderSize;
    insets.left +=
(borderSize+2);
    insets.bottom += borderSize;
    insets.right +=
(borderSize+2);
    return insets;
  }

  public void paint(Graphics g) {
    super.paint(g);
    Insets insets = su-
per.getInsets();
    int w = getSize().width-
insets.left-insets.right;
    int h = getSize().height-
insets.top-insets.bottom;

g.setColor(editor.getEinstellunge
n().toolbarBgCo);
    for (int i=0; i<borderSize;
i++) {

g.draw3DRect(i+insets.left,i+inse
ts.top,
                        w-2*i-1, h-
2*i-1, i<borderSize/2);
    }
  }

  /**
   * Fügt einen ToolButton hinzu.
   */
  public void addToolBut-
ton(ToolButton button) {
    add(button);
  }

  /**
   * Entfernt einen ToolButton.
   */
  public void deleteTooleBut-
ton(ToolButton button) {
  }

  /**
   * Setzt das aktuelle Tool;
   * wird normalerweise von den
ToolButtons aufgerufen.
   */
  public void setCurrentTool(Tool
currentTool) {
    this.currentTool = current-
Tool;
    this.currentTool.reset();
  }

  /**
   * Setzt den aktuellen Button,
damit der nachste
   * aktuelle Butten ihn zurück-
setzen kann.
   */
  public void setCurrentBut-
ton(ToolButton currentButton) {
    if (this.currentButton !=
null)
      this.currentButton.setUp();
    this.currentButton = current-
Button;
    this.currentButton.setDown();

  }

  /**
```

```
   * Liefert das aktuelle Tool
zurück.
   * wird normalerweise von den
Zeichenfläche aufgerufen.
   */
  public Tool getCurrentTool() {
    return currentTool;
  }

  /**
   * Liefert den aktuellen But-
ton, damit der nächste
   * aktuelle Butten ihn zuruck-
setzen kann.
   */
  public ToolButton getCurrent-
Button() {
     return currentButton;
  }

  /**
   * Liefert den Editor an die
Buttons weiter.
   */
  public GraphEditor getEditor()
{
     return editor;
  }

}//Toolbar
```

Patent claims

1. A method for determining a graphic structure of a technical system,

a) in which a graph structure file is selected from a set of a plurality of different graph structure files, a graph structure file containing in each case indications of which elements can be selected to represent it in order to describe the structure of the technical system graphically,

b) in which elements are selected in such a way that the technical system is described using the selected elements, and

c) in which the elements are represented by an editor program into which the selected graph structure file has been integrated, by which means the graphic structure of the technical system is determined.

2. The method as claimed in claim 1, in which the technical system is an electronic circuit.

3. The method as claimed in claim 2, in which the technical system is a piece of technical equipment.

4. The method as claimed in one of claims 1 to 3, in which the elements are graph elements of a graph which describe the technical system.

5. The method as claimed in one of claims 1 to 4, in which the graphic structure of the technical system which is determined is checked for predefined structure rules.

6. An arrangement for determining a graph structure of a technical system,

a) having a memory in which a set of a plurality of different graph structure files are stored,

a graph structure file containing in each case indications of which elements can be selected to represent it in order to form a graph,

b) having a selector unit with which a graph structure file can be selected from the set of graph structure files,

c) having a processor which is configured in such a way that an editor program can be executed, with which editor program a graph structure file selected from the set of graph structure files can be used to determine a graph with elements of the selected graph structure file, by which means the graph structure is determined,

d) having a representation component which is coupled to the editor program and with which the specific graph structure can be represented.

7. The arrangement as claimed in claim 6, in which a structure of a technical system is described using the graph.

8. The arrangement as claimed in claim 7, in which the technical system is an electronic circuit.

9. The arrangement as claimed in claim 7, in which the technical system is a piece of technical equipment.

10. The arrangement as claimed in claim 6,

a) having a first subarrangement which has the memory,

b) having a second subarrangement which is coupled to the first subarrangement and has the following components:

- the selector unit,
- the editor program,
- the representation component.

11. The arrangement as claimed in claim 10, in which the first subarrangement and the second subarrangement are coupled to one another by means of a communications network.

12. The set of arrangements as claimed in claim 10 or 11, in which a structure of a technical system is described using the graph.

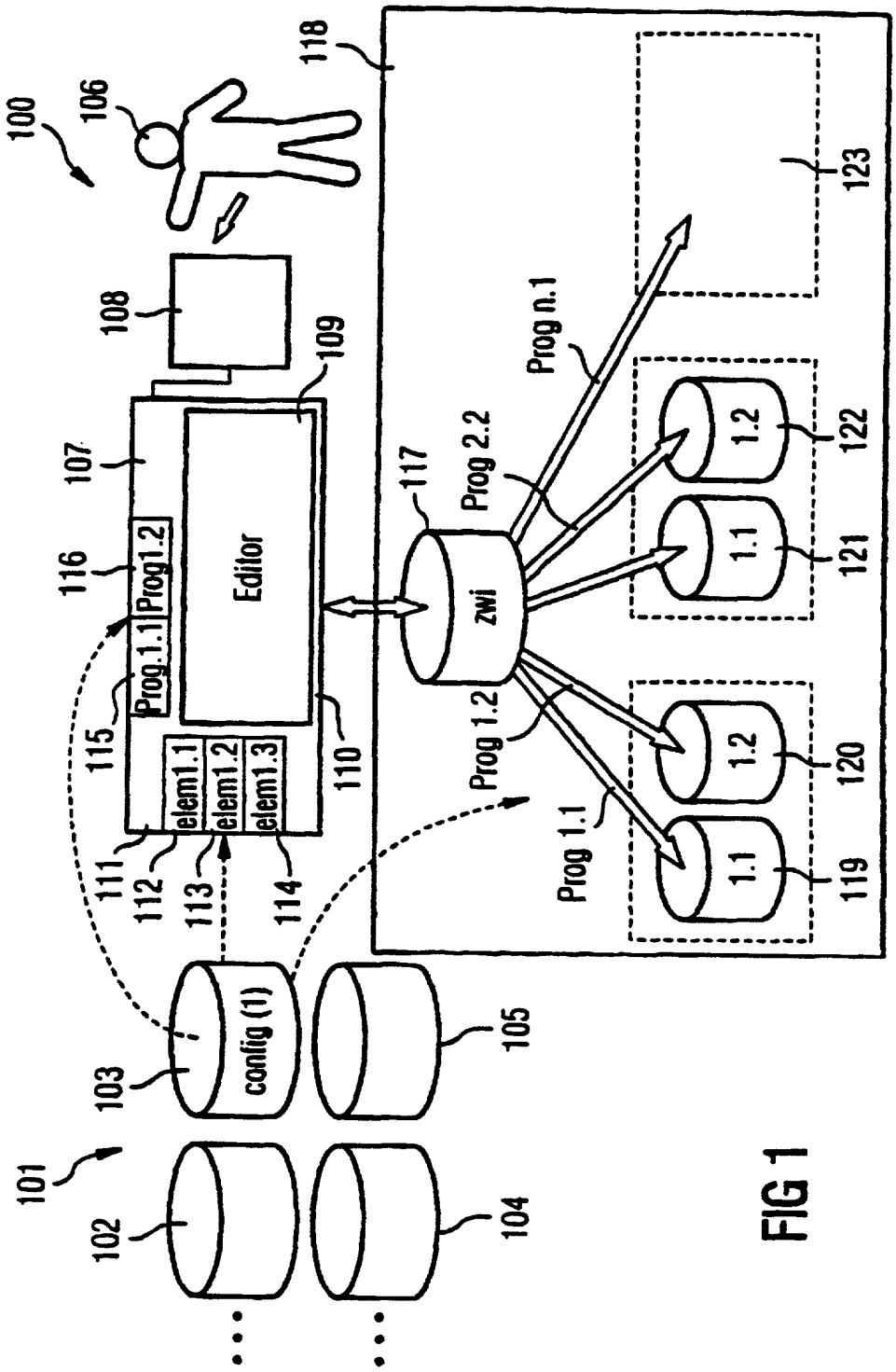
13. The arrangement as claimed in claim 12, in which the technical system is an electronic circuit.

14. The arrangement as claimed in claim 12, in which the technical system is a piece of technical equipment.

Abstract

Method for determining a graphic structure of a technical system and arrangement and set of arrangements for determining a graph structure

A graph structure file is selected from a set of a plurality of different graph structure files. A graph structure file contains in each case indications of which elements can be selected to represent it in order to describe the structure of the technical system graphically. Elements are selected in such a way that the selected elements describe the technical system, and the elements are represented by an editor program into which the selected graph structure file has been integrated.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config (1)
Editor
Prog.1.1
Prog1.2
elem1.1
elem1.2
elem1.3
ZWI
Prog 1.1
Prog 1.2
Prog 2.2
Prog n.1
1.1
1.2

FIG 1

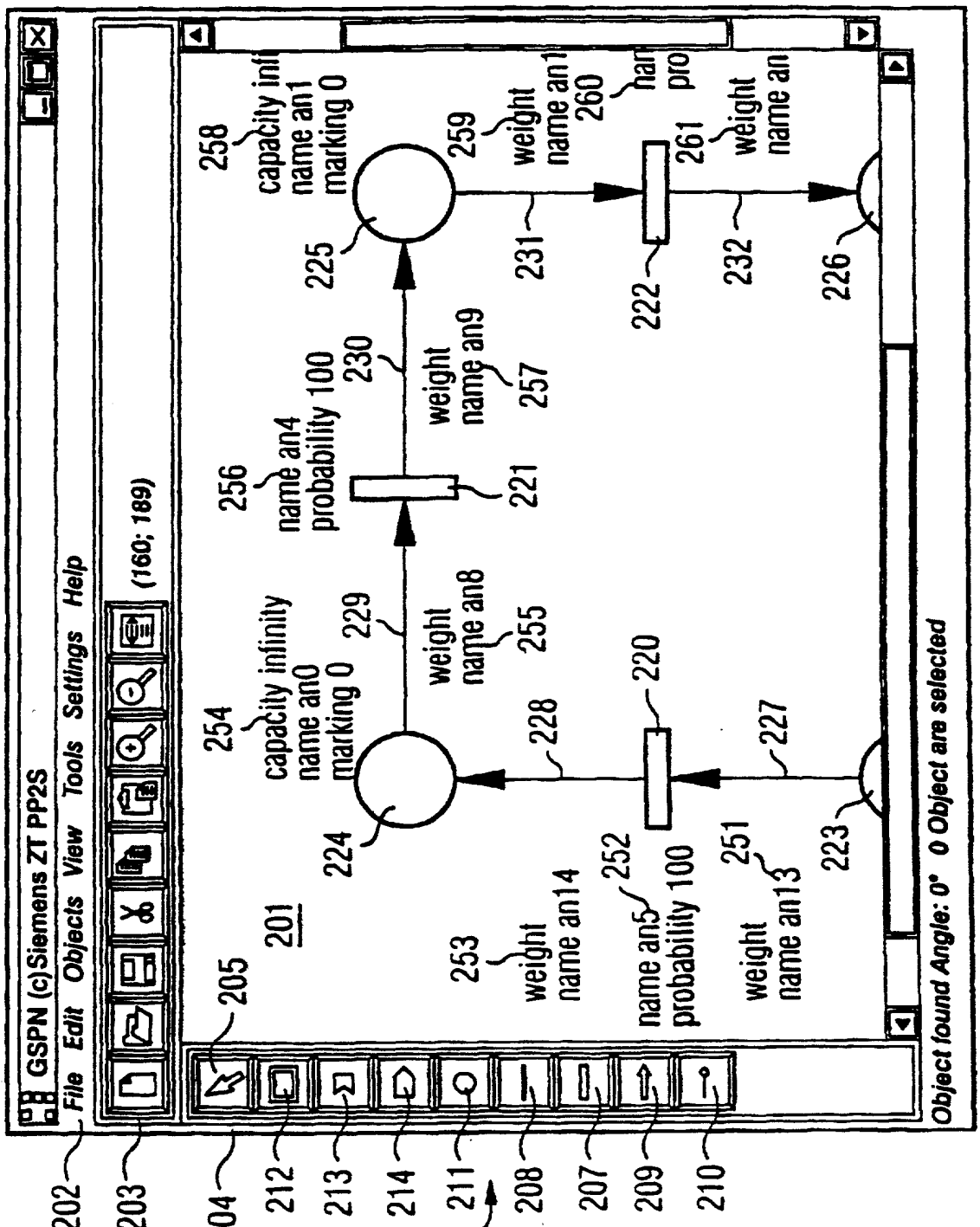
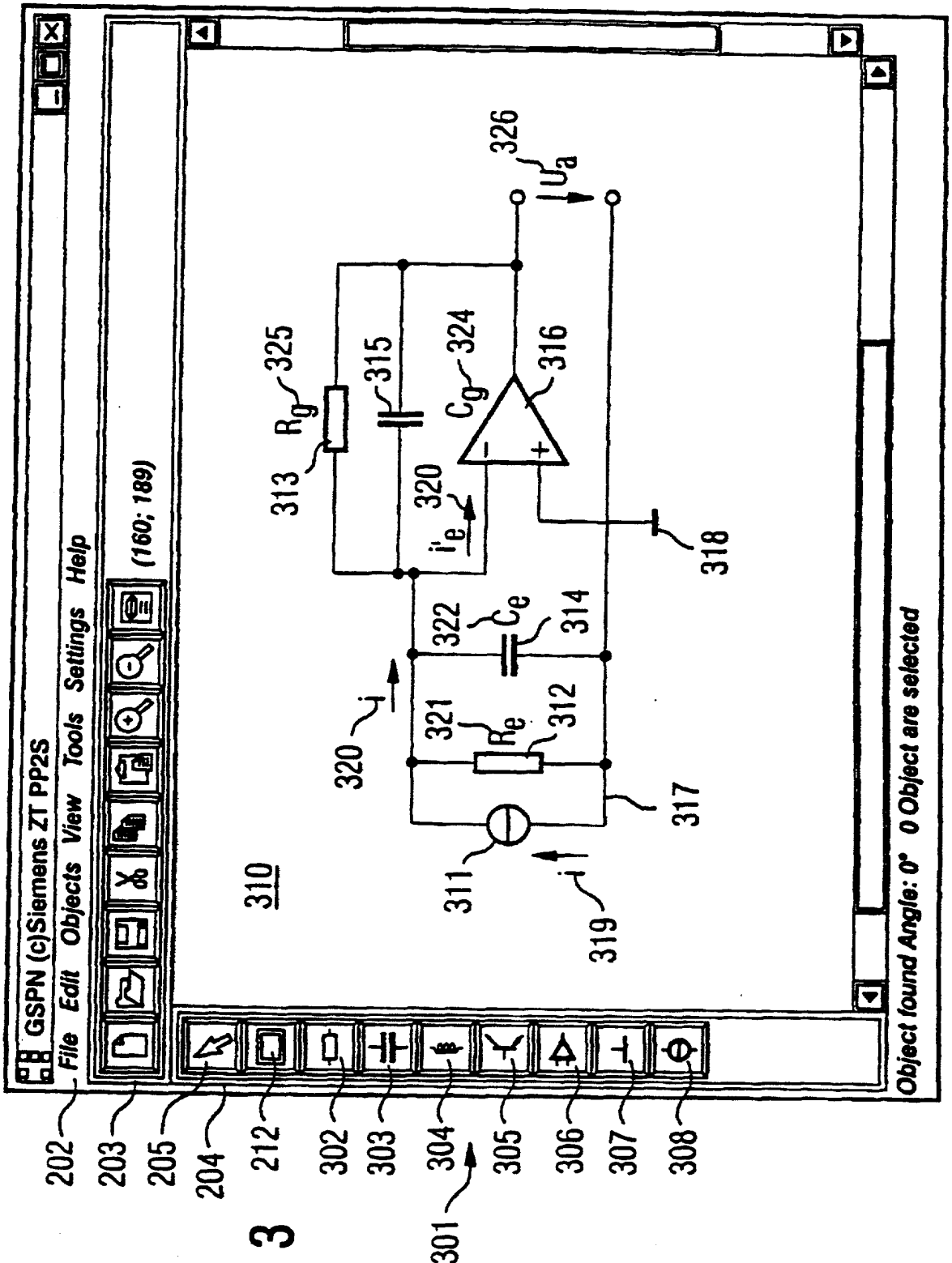


FIG 2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314 C_e
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321 R_e
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324 C_g
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FIG 3

FIG 4

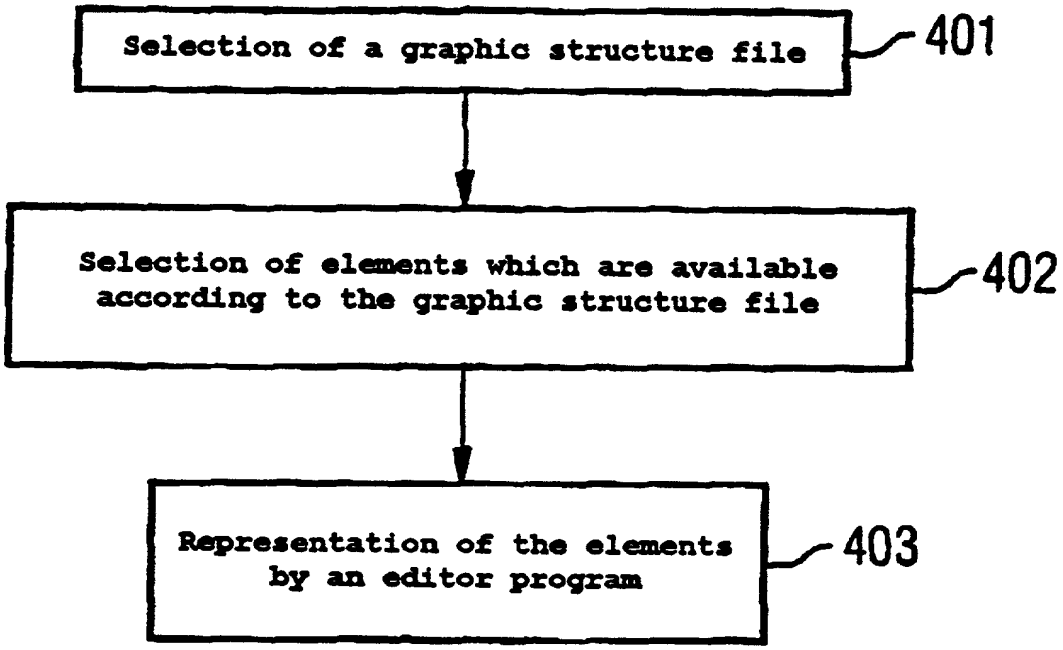
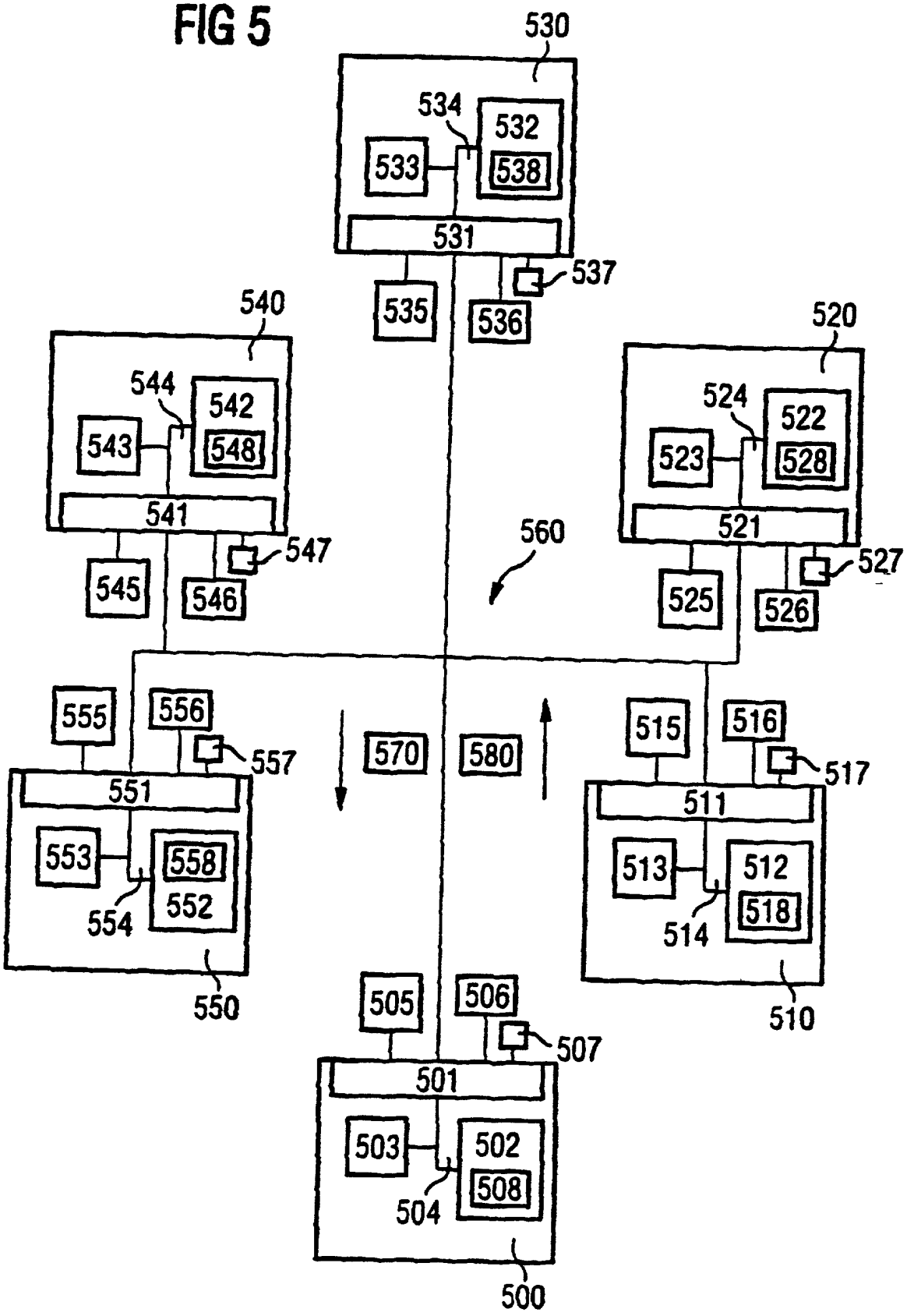

Selection of a graphic structure file
401
Selection of elements which are available according to the graphic structure file
402
Representation of the elements by an editor program
403

FIG 5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DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION
ERKLÄRUNG FÜR PATENTANMELDUNGEN MIT VOLLMACHT
German Language Declaration

Als nachstehend benannter Erfinder erkläre ich hiermit an Eides Statt:

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Verfahren zur Bestimmung Einer Graphischen Struktur Eines Technischen Systems und Anordnung Sowie Satz Von Anordnungen zur Bestimmung Einer Graphen-Struktur

deren Beschreibung

(zutreffendes ankreuzen)

■ hier beigefügt ist.

□ am _____ als
PCT internationale Anmeldung
PCT Anmeldungsnummer _____
eingereicht wurde und am _____
abgeändert wurde.

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My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

the specification of which

(check one)

□ is attached hereto

□ was filed on _____ as
PCT international application
PCT Application No. _____
and was amended on _____

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing data before that of the application on which priority is claimed:

German Language Declaration

Prior foreign applications
Priorität beansprucht

			Priority Claimed	
198 39 972.3	Germany	02 September 1998	■	□
(Number) (Nummer)	(Country) (Land)	(Day Month Year Filed) (Tag Monat Jahr eingereicht)	Yes Ja	No Nein
			□	□
(Number) (Nummer)	(Country) (Land)	(Day Month Year Filed) (Tag Monat Jahr eingereicht)	Yes Ja	No Nein
			□	□
(Number) (Nummer)	(Country) (Land)	(Day Month Year Filed) (Tag Monat Jahr eingereicht)	Yes Ja	No Nein

Ich beanspruche hiermit gemäss Absatz 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 120, den Vorzug aller unten aufgeführten Anmeldungen und falls der Gegenstand aus jedem Anspruch dieser Anmeldung nicht in einer früheren amerikanischen Patentanmeldung laut dem ersten Paragraphen des Absatzes 35 der Zivilprozeßordnung der Vereinigten Staaten, Paragraph 122 offenbart ist, erkenne ich gemäss Absatz 37, Bundesgesetzbuch, Paragraph 1.56 meine Pflicht zur Offenbarung von Informationen an, die zwischen dem Anmeldedatum der früheren Anmeldung und dem nationalen oder PCT internationalen Anmeldedatum dieser Anmeldung bekannt geworden sind.

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §122 I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56 which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

(Application Serial No.) (Anmeldeseriennummer)	(Filing Date) (Anmeldedatum)	(Status) (patentiert, anhängig, aufgegeben)	(Status) (patented, pending, abandoned)
(Application Serial No.) (Anmeldeseriennummer)	(Filing Date) (Anmeldedatum)	(Status) (patentiert, anhängig, aufgegeben)	(Status) (patented, pending, abandoned)

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And I hereby appoint all Attorneys identified by United States Patent & Trademark Office customer number 28574, who are all members of the firm of Schiff Hardin and Waite.

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312/258-5500

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6600 Sears Tower, Chicago, Illinois 60606-6473

CUSTOMER NUMBER 26574

Voller Name des einzigen oder ursprünglichen Erfinders: THURNER, Erwin	Full name of sole or first inventor:
Unterschrift des Erfinders Datum: Thurner Erwin 1.3.2001	Inventor's signature Date
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Staatsangehörigkeit Bundesrepublik Deutschland	Citizenship
Postanschrift Josef-V-Hirsch-Str. 23	Post Office Address
82152 Planegg Bundesrepublik Deutschland	

Voller Name des zweiten Miterfinders (falls zutreffend):	Full name of second joint inventor, if any:
Unterschrift des Erfinders Datum	Inventor's signature Date
Wohnsitz	Residence
Staatsangehörigkeit	Citizenship
Postanschrift	Post Office Address

(Bitte entsprechende Informationen und Unterschriften im Falle von weiteren Miterfindern angeben).

(Supply similar information and signature for subsequent joint inventors).